

# FOOD TECHNOLOGY *Abstracts*

Vol. 28 No. 3 March 1993



Central Food Technological Research Institute, Mysore  
National Information System for Science and Technology  
Department of Scientific and Industrial Research, New Delhi.



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*The Head*

*FOSTIS, CFTRI,*

*Mysore 570 013,*

*Karnataka, India.*



# **FOOD TECHNOLOGY ABSTRACTS**

Vol. 28 No. 3  
March 1993

National Information Centre For Food Science And Technology  
Central Food Technological Research Institute,  
Mysore - 570 013, India

**Compiled and Edited by**

B. Vasu

C. S. Anita

Geetha Seetharam

**Abstractors to FTA**

AA Author's Abstract

BV B. Vasu

CSA C. S. Anita

GS Geetha Seetharam

KAR K. A. Ranganath

SD S. Dhanaraj

SRA S. R. Ananthnarayan

VKR V. Krishnaswamy Rao

**Computerisation and Database Creation**

P. Manilal

C. S. Anita

B. Vasu

S. R. Ananthnarayan

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## ABBREVIATIONS

A	ampere
AAS	atomic absorption spectrometry
ADP	adenosine diphosphate
Anon.	Anonymous
AOAC	Association of Official Analytical Chemists
approx.	approximately
atm	atmosphere
ATP	adenosine triphosphate
a <sub>w</sub>	water activity
BHA	butylated hydroxyanisole
BHT	butylated hydroxytoluene
BOD	biological oxygen demand
b.p.	boiling point
Btu	British thermal unit
c-	centi- [as in cm, cm <sup>2</sup> , cm <sup>3</sup> ]
cal	calorie
cd	candela
°C	degree centigrade
Ci	curie
CMC	carboxymethyl cellulose
COD	chemical oxygen demand
coeff.	coefficient
conc.	concentrated
concn.	concentration
cv.	cultivar
cwt	hundredweight
d-	deci-
DE	dextrose equivalent
detn.	determination
DFD	dark firm dry
diam.	diameter
dil.	dilute
DM	dry matter, Deutsche Mark
DNA	deoxyribonucleic acid(s)
dyn	dyne
E.	East, Eastern, etc
ECD.	electron capture detection
EDTA	ethylenediaminetetraacetic acid
Eh	oxidation-reduction potential
ELISA	enzyme-linked immunosorbent assay
f-	femto-[10 <sup>-15</sup> , as in fCi]
°F	degree Fahrenheit
FAO	Food and Agricultural Organization
FDA	Food and Drug Administration
FID	flame ionization detection
fl oz	fluid ounce
f.p.	freezing point
ft	foot, feet
g	gram

GC	gas chromatography
gr	gravity
gal	gallon
gf	gram-force
GLC	gas-liquid chromatography
h	hour
ha	hectare
HDPE	high density polyethylene
hl	hectolitre [100 l]
hp	horse power
HPLC	high performance/pressure liquid chromatography
HTST	high temperature short time
Hz	hertz [frequency cycles/s]
in	inch
IR	infrared
IU	international unit
J	joule
k-	kilo- [as in kcal, kg]
K	Kelvin
l	litre
lb	pound
lbf	pound-force
LDPE	low density polyethylene
m-	milli- [as in mg, ml, mm]
m-equiv	milli-equivalent
M	molar concentration
M-	mega- [as in Mrad]
max.	maximum
min	minute [time]
min.	minimum
mol	mole
mol.wt.	molecular weight
m.p.	melting point
MPN	most probable number
MS	mass-spectrometry
n-	nano-[10 <sup>-9</sup> , as in nm]
N	Newton [kg m/s <sup>2</sup> ]
N.	North, Northern, etc
N	Normal concentration
NMR	nuclear magnetic resonance
NPU	net protein utilization
oz	ounce
p-	pico- [10 <sup>-12</sup> , as in pCi]
P	Poise
p	probability
Pa	pascal (N/M <sup>2</sup> )
PAGE	polyacrylamide gel electrophoresis
PER	protein efficiency ratio
p.p.b.	parts per billion
p.p.m.	parts per million
PSE	pale soft exudative
PTFE	polytetrafluoroethylene
PVC	polyvinyl chloride
PVDC	polyvinylidene chloride

qt	quart
R	rontgen
rad	rad or radian
ref.	reference(s)
rev/min	revolutions per minute
RH	relative humidity
RNA	ribonucleic acid(s)
S.	South, Southern, etc.
s.d.	standard deviation
SDS	sodium dodecylsulphate
s.e.	standard error
s	second [time]
SNF	solids-not-fat
sp., spp.	species
sp.gr.	specific gravity
summ.	summary
Suppl.	Supplement
t	metric tonne
temp.	temperature
TLC	thin layer chromatography
TS	total solids
UHT	ultra-high temperature
UV	ultraviolet
V	volt
var.	variety
vol.	volume
v/v	volume/volume
W	watt
W.	West, Western, etc.
WHO	World Health Organization
w/v	weight/volume
wk	week
wt.	weight
yd	yard
yr	year
μ	micro-[as in g, μm]
%	per centum
>	greater than
≥	greater than or equal to; not less than
<	less than
≤	less than or equal to; not greater than

## ABBREVIATIONS FOR LANGUAGES

Language of text

Dutch	Nl
French	Fr
German	De
Italian	It
Japanese	Ja
Norwegian	No
Spanish	Es
Swedish	Sv



## GENERAL

501

Ganguly (A). **Trends in technology and their relevance to the international food market.** *Food Science and Technology Today* 5(3); 1991; 139-145

The paper examines the global food business, the main consumer trends and the technological challenges of the 1990s. GS

502

Francis (FJ). **Consumer perception of food safety: The American scene.** *Indian Food Industry* 11(3); 1992; 33-35, 41

This paper examines the public perception of the safety of food additives. Tests conducted for carcinogens and non-carcinogens and the interpretation of the data based on certain examples such as alar (a plant hormone), fish in the Great Lakes and bovine somatotropin (a naturally occurring hormone that stimulates milk production) showed that alar and its breakdown products were not carcinogenic and the fish in Great Lakes created a risk of cancer of one in 10,000 in a lifetime. CSA

503

Srivastav (PP). **Roasted blended foods as speciality foods.** *Indian Food Industry* 11(3); 1992; 42-45

The methods for the preparation of low-cost roasted blended speciality foods by roasting or puffing, improvement of food quality through blending, blended foods based on roasting, methods of roasting and puffing, initial moisture content for roasting and puffing, conditioning, addition of salt, pre-heating, roasting and puffing, traditional devices for roasting and puffing, improved devices for roasting and puffing are the aspects explained. CSA

504

Kaul (PL). **Large potential but lost opportunities.** *Indian Food Packer* 47(3); 1992; 27-33

Production of fruits and vegetables in India, world performance in processing fruits and vegetables, export status of Indian food products and the domestic production potential and the export forecast are discussed. KAR

## FOOD PROCESSING

505

Cheryan (M). **Reverse osmosis in food processing.** *Indian Food Industry* 10(6); 1991; 30-37

Application of reverse osmosis (RO) technology in dairy and fruit juice industries is focussed in this article. Among the dairy industry the use of RO for concn. of milk, reduction of milk transport costs, production of fluid cost in dairy plant operations, production of cheese whey and fermented products by RO milk concentrates are dealt. The use of RO technology in the clarification, concn. and deacidification of apple, orange, tomato and other juices are also covered. CSA

506

Anon. **Application of high pressure to food processing and preservation.** *Indian Food Industry* 10(6); 1991; 39

507

Richardson (P). **Microwave technology - the opportunity for food processors.** *Food Science and Technology Today* 5(3); 1991; 146-148

Microwaves offers the food processors many new tools for improving food product var. and quality. This article presents an overview of application of microwave heating in the food processing industry. GS

508

Camire (ME). **Protein functionality modification by extrusion cooking.** *Journal of the American Oil Chemist's Society* 68(3); 1991; 200-205

This review discusses the effects of extrusion on proteins and protein foods in addition to possible new directions for protein extrusion based upon advances in other areas. Aspects covered include: extrusion process, protein denaturation, functional characteristics, nutritional changes and future developments. 48 references. BV

## FOOD PACKAGING

509

Oki (Y). **Recent development of food packaging materials and the expansion of its application.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(1); 1991; 66-71 (Ja)

Review. 8 references. BV



510

Anon. **Ohmic resistance heating.** *Indian Food Industry* 10(6); 1991; 38

511

Anon. **Supercritical gas extraction.** *Indian Food Industry* 10(6); 1991; 40

512

Anon. **Scraped surface heat exchanger (SSHE).** *Indian Food Industry* 10(6); 1991; 41

513

Mckenna (BM). **The role of physical properties in the development of new products and processes.** *Indian Food Industry* 10(6); 1991; 42-46

Aspects covered in this article are the physical properties of foods such as shape, colour and mechanical properties, the problems generated by shape and the solutions suggested based on the example from meat, poultry and fish industries. CSA

514

Maesmans (G), Hendrickx (M), Decordt (S), Fransis (A) and Tobback (P). **Fluid-to-particle heat transfer coefficient determination of heterogeneous foods. A review.** *Journal of Food Processing Preservation* 16(1); 1992; 29-69

The review discusses the importance of the fluid-to-particle convective heat transfer coeff. ( $h_{fp}$ ) in thermal processing heterogenous foods (brine, sauce). Methods to determine  $h_{fp}$  and problems encountered upon their application is reviewed. It gives an overview of the experimental approaches to quantify this parameter in traditional canning as well as aseptic processing. The wide range of previously determined  $h_{fp}$  suggests the need for developing a reliable method to determine the fluid-to-particle heat transfer coeff. in different processing systems under varied conditions. 81 references. SD

515

Sancho (MF) and Rao (MA). **Residence time distribution in a holding tube.** *Journal of Food Engineering* 15(1); 1992; 1-19

The residence time distribution (RTD) of 2 Newtonian (water and 12% sucrose solution) and 2 non-Newtonian liquids (0.2 and 0.4% guar gum solution), at a min. of 5 different flow rates each, was

determined in a holding tube consisting of 10 sections with a total length of 33 m, at 25 plus or minus 0.5°C. The response to a pulse of NaCl solution was detected by a conductivity transmitter and recorded. The relative variances of the experimental RTD curves were used to evaluate the dispersion and the tanks-in-series models. In general, vessel dispersion numbers were higher in laminar flow. For water in laminar flow, the number of tanks-in-series ranged between 14 and 20, whereas in turbulent flow the number was between 61 and 103. For the sugar solution the number of tanks-in-series was higher. For the 0.2% gum solution data the number of tanks was estimated to be between 18 and 34, while for the 0.4% gum solution data it was estimated to be between 7 and 12. Neither model can be said to be better than the other. AA

516

de Alwis (AAP) and Fryer (PJ). **Operability of the ohmic heating process: Electrical conductivity effects.** *Journal of Food Engineering* 15(1); 1992; 21-48

Ohmic heating is a novel commercial process in which an electric current is applied to a flowing food stream. The passage of current generates heat, which is used to sterilise the food; it is thus possible to sterilise particles as fast as liquids. The controlling parameter is the electrical conductivity of the solid and liquid phases. The range of conductivities which are acceptable to the ohmic process have been examined by finite element simulation. The variation of electrical conductivity in the components of a feed mix on the operability of the process is considered, together with the ohmic heating patterns of composite materials. Providing the conductivities of the 2 phases do not differ significantly even heating will result. Other process conditions are also briefly discussed. AA

517

Anon. **Some features of the parameter  $k$  of the GAB equation as applied to sorption isotherms of selected food materials.** *Journal of Food Engineering* 15(1); 1992; 75-82

This work reports that the parameter  $k$  (factor correcting the properties of the multilayer) in the GAB sorption equation varies from nearly unity to as low as 0.56 for a large var. of food constituents and related materials. Values of  $k$  for proteins fall in a relatively narrow range of 0.82 - 0.88 (av. 0.84 plus or minus 0.03 SD), while for starchy materials they fall in the range 0.70 - 0.77 (av. 0.74 plus or minus 0.03 SD). AA



Nil

## FOOD CHEMISTRY AND ANALYSIS

### Chemistry

518

Alaimo (LH), Ho (C-T) and Rosen (JD). **Effect of protein glycation on subsequent volatile formation.** *Journal of Agricultural and Food Chemistry* 40(2); 1992; 280-283

Lysozyme was incubated with glucose at 25°C and either 12%, 65%, or 76% RH for 30 days or at 50°C and 65% RH for 3 days. The volatiles generated by the subsequent heating of the glycated samples and their individual polymeric components were trapped and analyzed by GC/MS. The glycated lysozyme incubated at 25°C showed qualitative differences in volatiles generated at different RH. The sample incubated at 50°C generated more glucose-derived volatiles than the 25°C samples. Different volatiles were generated from each of the polymeric components isolated from the 50°C sample of glycated lysozyme. It was demonstrated that storage conditions have an effect on the nature of volatiles generated upon subsequent heating. AA

519

Schopplein (E) and Dietrich (H). **Characterization of polysaccharide degrading enzymes in a technical pectinase preparation.** *Deutsche Lebensmittel-Rundschau* 87(7); 1991; 212-219 (De)

An endo-arabinanase, an arabinofuranosidase, a  $\beta$ -1,4-galactanase and endo-polygalacturonase were isolated and biochemically characterized from a technical pectinase. Mol. wt., isoelectric points,  $K_M$ -values, temp.- and pH-optima as well as temp.- and pH-stability were determined. The mechanism of reaction was examined with the pure substrate. Finally the enzymatic degradation of fruit and juice polymers was investigated. AA

520

Maslowska (J) and Leszczynska (J). **A new enzymatic method for the determination of Mg(II) in drinking waters and soft drinks with the use of isocitrate dehydrogenase.** *Deutsche Lebensmittel-Rundschau* 87(7); 1991; 220-222

A procedure is described how to utilize the activation of isocitrate dehydrogenase with Mg(II) for the detn.

of the  $Mg^{2+}$  content in water and drinks. The limit of detection of  $Mg^{2+}$  in this method is 0.24 mg/ml. The developed method includes procedures for the preparation of samples and making measurements. It has been shown that the content of Mg(II) in the tested samples of drinking water and drinks is from 0.94 to 3.15 mg/l. The new enzymatic-spectrophotometric method is simple and sensitive and can be of great service in control of the Mg(II) level in drinks and food products. AA

### Chemistry (Analytical)

521

Barbera (R), Farre (R) and Mesado (D). **Determination of Cd, Co, Fe, Pb, Mn, Ni and Zn in diets: Development of a method.** *Die Nahrung* 35(7); 1991; 683-687

A method useful for the detn. of Cd, Co, Cu, Fe, Pb, Mn, Ni and Zn in diets is described. Organic matter is destroyed applying a wet procedure, and element content is measured by flame atomic absorption spectroscopy (FAAS) in the case of Cu, Fe, Mn, Ni and Zn, and by graphite furnace (GF-AAS) in the case of Cd, Co and Pb. The matrix interference study is carried out. Values found for linearity, detection and quantitation limits as well as accuracy show that the described method is useful to determine the elements taken into account at usual levels in diets. AA

522

Patel (PD). **The applications of lectins in food analysis.** *Trends in Food Science and Technology* 3(2); 1992; 35-39

Reviews the recent progress in the uses of lectins and labelled lectins in food analysis. Topics covered are estimation of polysaccharide additives (guar gum, locust bean gum) in food determining the presence of terminal glycosyl unit in glycoproteins and lipopolysaccharides; mechanism of lectin reaction; application of lectins in detecting microorganisms and moulds; interactions with bacteria of epidemiological significance and in virus detection. GS

523

Wedzicha (BL), Bellion (IR) and Goddard (SJ). **Infrared and ultraviolet spectra of sulphur (IV) oxospecies in water-non-electrolyte mixtures.** *Food Chemistry* 44(3); 1992; 165-171

Ultraviolet spectra of solution containing  $NaHSO_3$  in water-non-electrolyte (ethanol, glycerol, polyethylene glycol, sucrose) mixtures show a decrease in the intensity of the peak due to  $S_2O_5^{2-}$ .



with increasing non-electrolyte concn. Infrared spectroscopy in water-glycerol mixtures is consistent with the possibility that addition of glycerol reduces the concn. of  $S_2O_5^{2-}$ . It is possible that  $S_2O_5^{2-}$  ions may be less important in partially dehydrated foods than expected from the known behaviour of  $NaHSO_3$  in simple aqueous solutions. AA

524

Sen (NP), Baddoo (PA), Seaman (SW) and Weber (D). **Simultaneous determination of 2-(hydroxymethyl)-N-nitrosothiazolidine-4-carboxylic acid and 2-(hydroxymethyl)-N-nitrosothiazolidine in smoked meats and cheese.** *Journal of Agricultural and Food Chemistry* 40(2); 1992; 221-226

A method is described for the detn. of the two title compounds in various cured smoked meats, including bacon, smoked poultry products, and smoked cheeses. It is based on (a) extraction of the sample with methanol or acetonitrile, (b) removal of fats and lipids by partitioning of the extract with isooctane, (c) cleanup and separation of the 2 compounds on an acidic alumina sample preparation cartridge, (d) derivatization of 2-(hydroxymethyl)-N-nitrosothiazolidine-4-carboxylic acid to its methyl ester (HMNTCA-ME), and (e) detn. of HMNTCA-ME and 2-(hydroxymethyl)-N-nitrosothiazolidine (HMNTHZ) by HPLC thermal energy analyzer technique. The recoveries of HMNTHZ and HMNTCA added to various products at 10 - 20 and 50 - 200 p.p.b., respectively, varied between 82 - 112% (mean, 94%) and 58 - 101% (mean, 79%). Confirmation was carried out by GLC-MS analysis of HMNTHZ as its O-methyl ether and of HMNTCA-ME as its heptafluorobutyl derivative. AA

525

Schwedt (G). **A compound method comprising calorimetry and ion chromatography for use in calorific-value and mineral-contents analyses in foodstuffs.** *Deutsche Lebensmittel-Rundschau* 87(7); 1991; 223-224 (De)

The burning of food samples in a calorimeter bomb (in pure oxygen) to determine the physical calorific value was used as the decomposing procedure for subsequent ion chromatography (IC) analysis of the minerals Na, K, Ca and Mg, to make it a compound procedure. To this effect, a quantitative solution steps for the ashes from the calorimeter bomb, with the elutriant for the IC analysis - EDTA-serving at the same time as a solvent for the ashes was developed. Separation of cations was done on polybutadiene maleic acid coated silica gel (Metrohm Super-Sep cation separation column), detection by

means of a conductivity detector. A comparison of this solubilizing method with dry incineration at 600°C yielded results of good congruence. AA

526

Mukhopadhyay (D) and Karmakar (SK). **Modernization of testing in processed food sector-problems and agenda for action.** *ISI Bulletin* 6(2); 1992; 51, 52

The lead taken by BIS towards augmenting its lab. facilities and exposing the industry to EEC opinion are discussed. Aspects discussed include standardization in food products, modernization of testing facilities, and international exposure. SRA

## FOOD MICROBIOLOGY AND HYGIENE

### Microorganisms

527

Kone (K) and Fung (DYC). **Understanding bacteriocins and their uses in foods.** *Dairy, Food and Environmental Sanitation* 12(5); 1992; 282-285

Food processors, researchers, or regulatory agents concerned with the safety of food supply with bacteriocins and their potential uses are briefly summarised in this article. Aspects included are: bacteriocins, factors affecting bacteriocin production, methods of detection and purification, bacterial susceptibility to bacteriocins, bacteriocins of lactic acid bacteria, properties of bacteriocins, use of nisin as a GRAS (generally recognized as safe), and future research. SRA

528

Ito (H). **Decontamination of microorganisms without heating (ultraviolet, ionizing radiation and ozone).** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(1); 1991; 72-77 (Ja)

### Bacteria

529

Varadaraj (MC). **Methods for detection and enumeration of foodborne bacterial pathogens: A critical evaluation.** *Journal of Food Science and Technology (India)* 30(1); 1993; 1-13

The increasing consumer awareness has laid a greater emphasis on producing microbiologically safe foods for human consumption. A few important foodborne bacterial pathogens are predominant in foods and thus, are responsible in causing serious



public health hazards. In this context, it becomes necessary to subject the foods to accurate microbiological analysis, particularly for these dominating bacterial pathogens. This review critically analyses the methods of detection and enumeration of foodborne pathogenic bacteria with specific reference to the advantages and limitations of the methods. 89 references. AA

530

Patchett (RA), Back (JP), Pinder (AC) and Kroll (RG). **Enumeration of bacteria in pure cultures and in foods using a commercial flow cytometer.** *Food Microbiology* 8(2); 1991; 119-125

Use of the Skartron Argus 100 flow cytometer enabled the counting of pure cultures of bacteria to  $< 10^3$  cfu ml<sup>-1</sup> within a few min. Application of the technique to meat samples gave a good correlation with plate counts and enabled enumeration down to at least  $10^5$  cfu g<sup>-1</sup> within min. However, with samples of pate and milk, sensitivity was reduced. SRA

531

Earnshaw (R) and Gidley (J). **Molecular methods for typing bacterial food pathogens.** *Trends in Food Science and Technology* 3(2); 1992; 39-43

Reviews the latest mol. techniques like finger printing, plasmid profiling, pulsed-field gel electrophoresis and ribotyping, which help food microbiologists to detect differences and similarities between closely related bacteria; and which ultimately, can be used to control microbial hazards and facilitate quality control of food. 46 references. GS

532

Ozen (S) and Ozilgen (M). **Effects of substrate concentration on growth and lactic acid production by mixed cultures of *Lactobacillus bulgaricus* and *Streptococcus thermophilus*.** *Journal of Chemical Technology and Biotechnology* 54(1); 1992; 57-61

The kinetics of growth and lactic acid production by mixed cultures of *L. bulgaricus* and *S. thermophilus* were modeled with a set of modified logistic and Luedeking-Piret equations. The specific growth rates and the inhibitory effect of each individual species on the mixed culture growth were found to be determined by the media composition. The kinetic analysis clearly showed that the contribution of each microbial species to the mixed culture growth process changed drastically when the substrate concn. was about 15%. This optimum initial substrate concn. was in agreement with the results of the previous studies and the optimum

found by trial and error procedure in commercial yoghurt production. AA

### **Bifidobacterium bifidum**

533

Corre (C), Madec (M-N) and Boyaval (P). **Production of concentrated *Bifidobacterium bifidum*.** *Journal of Chemical Technology and Biotechnology* 53(2); 1992; 189-194

A low-cost medium was developed to produce expensive dairy starter cultures easily and economically. Conc. suspensions of *Bifidobacterium bifidum* were obtained in a continuous process using a continuous stirred tank reactor coupled to an ultrafiltration device in non-anaerobic conditions. Bacterial productivity of  $2 \times 10^8$  organisms cm<sup>-3</sup>h<sup>-1</sup> were achieved using a whey-based medium, a 15-fold improvement on batch productivity. The starter culture suspensions could be stored at 4°C or frozen without washing, or with the addition of cryoprotective media, with maintenance of high viability. AA

### **Lactobacillus bulgaricus**

534

Buyukgungor (H). **Stability of *Lactobacillus bulgaricus* immobilized in k-carrageenan gels.** *Journal of Chemical Technology and Biotechnology* 53(2); 1992; 173-175

The future application of immobilized microorganism techniques will depend on the development of systems which are technologically applicable on an industrial scale. These techniques must permit high microbial concn. and must allow mass transfer to take place with low diffusional limitations. In addition, the mechanical separation of the immobilized microorganisms must be achieved economically. *k*-Carrageenan was used as an ionotropic gel carrier for the immobilization of *Lact. bulgaricus* (ATCC 11842), and the effects of gel stability on productivity and the rate of product formation were investigated. *k*-Carrageenan gels had higher mechanical and chemical stability than alginate gels. The storage stability of microorganisms immobilized in *k*-carrageenan was good enough to retain biocatalytic activity during prolonged storage at 4°C. AA

### **Listeria**

535

Farber (JM). **Prevention and control of foodborne listeriosis.** *Dairy, Food and Environmental Sanitation* 12(6); 1992; 334-340



Control of *Listeria monocytogenes* in dairy industry (control at farm level and at the dairy plant), meat industry, seafood industry is discussed in this article. SRA

## BIOTECHNOLOGY

536

Dua (S), Kaur (M) and Ahluwalia (AS). **Functional properties of two pollutant grown green algae.** *Journal of Food Science and Technology (India)* 30(1): 1993; 25-28

*Scenedesmus obliquus* and *Klebsormidium flaccidum* (filamentous) were predominant algae collected from polluted areas. Studies on the functional properties of their proteins showed that the isoelectric point of these proteins was in acidic range. Their solubility decreased in NaCl and ammonium sulphate sol., while relative viscosity decreased in the presence of urea and sodium lauryl sulphate. Foaming capacity and emulsifying activity were min., while emulsion stability was max. around isoelectric point. The viscosity, foaming and emulsification properties of *Scenedesmus* protein were more than *Klebsormidium* protein at equal protein concn. (0.4%). AA

537

Arad (SM) and Yaron (A). **Natural pigments from red microalgae for use in foods and cosmetics.** *Trends in Food Science and Technology* 3(4): 1992; 92-97

Red microalgae with their accessory pigments known as phycobiliproteins (red or blue) are potential natural colorants for use in foods. Aspects reviewed in this article are: red algae, red microalgae, cultivation in closed systems, characteristics and structure of the phycobiliproteins, effects of culture conditions on the content of phycobiliproteins, characteristics of the natural dyes from red microalgae, stability of natural algal colorants, applications and regulatory status of algal pigments and future developments. 17 references. BV

538

Krysteva (MA) and Yotova (LK). **Multienzyme membranes for biosensors.** *Journal of Chemical Technology and Biotechnology* 54(1): 1992; 13-18

Artificial multienzyme complexes were prepared in which enzymes were covalently bound to polysaccharide structures activated with urea and formaldehyde. Double enzyme complexes of glucose

oxidase and catalase, a glucose oxidase and invertase, were prepared by immobilization on to cellulose fabric. Also, catalase was covalently bound to soluble dextran. The resulting multienzyme systems were highly active and stable, making them suitable for use in measuring the concn. of glucose and saccharose in solution. The measurements were performed using an amperometric oxygen electrode and multienzyme membranes containing glucose oxidase and catalase for the first substrate, as well as glucose oxidase bound to cheese-cloth and a 'liquid' membrane of dextran-bound catalase. To determine the concn. of saccharose, a multienzyme membrane with bound glucose oxidase and invertase was used in combination with a 'liquid' dextran-catalase. The enzyme electrodes exhibited a measuring range of 0.1 - 5 mol. dm<sup>-3</sup> and a response time of 2 - 3 min. The electrodes may be used for measuring saccharose and glucose concn. both in fermentation broths and food products. AA

539

Papamichael (N), Borner (B) and Hustedt (H). **Continuous aqueous phase extraction of proteins: Automated processing and recycling of process chemicals.** *Journal of Chemical Technology and Biotechnology* 54(1): 1992; 47-55

A 2-stage aqueous phase extraction of the enzyme fumarase from baker's yeast is described with respect to the recycling of the upper effluent phase from the secondary extraction. It was found that the binodal curve position was only slightly altered by the presence of protein at different load levels and that enzyme specific activity in the product was improved at higher total protein concn., which simplified the recycling strategy. On-line enzyme and protein assays showed that disturbances during start-up and desludging operations were reflected in variations in the protein concn. in the various streams, but that the enzyme activities remained relatively stable. Recycling reduced the polyethylene requirements by 50% and that for potassium phosphate by 12%. A max. saving of PEG (polyethylene glycol) of approx. 70% was achieved at optimum conditions of extraction, compared to a value of 90% predicted by a theoretical description of the system. An economic analysis of the recycled process showed significant advantages compared with a non-recycled system, even though the capital outlay requirements for an automated, continuous system are much higher than for a manually run process. AA

540

Hussein (AM), El-Saied (H) and Yasin (MH). **Bioconversion of hemicelluloses of rice hull black liquor into single-cell protein.** *Journal of Chemical Technology and Biotechnology* 53(2): 1992; 147-152



Rice hulls were treated using several NaOH concn. and temp. The black liquor contents of silica, lignin and hemicelluloses increased with increase in temp. or NaOH concn. Hexoses constituted the major part and pentoses the minor part of the black liquor hemicelluloses. The ratio of pentoses to hexoses increased slightly with the increase of treatment variables. The pentose content of the black liquor consisted of arabinose and xylose, while the hexose composition was mannose, galactose, rhamnose and glucose. On increasing the alkali concn. the xylose and mannose concn. increased greatly, while galactose and glucose increased only slightly. Using 10 soil samples several isolates of fungi and actinomycetes were obtained. These were identified as 5 species of genus *Aspergillus*, 3 sp. *Paecilomyces*, 2 sp. *Penicillium*, one sp. each of *Alternaria*, *Trichoderma*, *Chaetomium* and *Actinopolyspora*. The fungi were cultivated on black liquor basal salts medium. The highest biocoverison rate of black liquor hemicelluloses into biomass and single-cell proteins was achieved by *Aspergillus terreus*, followed by *Paecilomyces simplicissima* then *Actinopolyspora* sp. AA

## TISSUE CULTURE

Nil

## FOOD ADDITIVES

541

Khanna (SK) and Mukul Das. **Safety and risk impact of intentionally added non-prescribed chemical additives in foodstuffs.** *ISI Bulletin* 6(2); 1992: 43-47

The extent of use of permitted and non-permitted food colours in milk and their products; confectionery, drinks and spice powders, edible oils and in cereals and pulses. This is based on authors survey conducted in Uttar Pradesh, India. SRA

### Antioxidants

542

Thurnham (DI). **Functionally important antioxidants and free radical scavengers in foods.** *Food Science and Technology Today* 6(1); 1992: 42-46

Covers formation of free radicals, normal control of radical formation, radical-initiated damage, physiological control of Fe, lipid peroxidation, nutritional factors and antioxidant defences,

influence of dietary intake on radical defences, influence of dietary antioxidants on health and dietary advice and conclusions. BV

## Colourants

543

Francis (FJ). **A new group of food colorants.** *Trends in Food Science and Technology* 3(2); 1992: 27-30

This feature article examines the recently discovered group of acylated B-ring-substituted anthocyanins as a potential stable natural food colorants. They are stable and show increased coloration at pH values of 4.0 - 5.5, where conventional anthocyanins are nearly colourless. Topics discussed include conventional anthocyanins and anthocyanins substituted in the B-ring (stability due to acylation and substitution). The acylated B-ring-substituted anthocyanins have not been commercialized as since none of the sources are recognized as normal food plants (*Tradescantia pallida*, *Ipomoea tricolor*). BV

## CEREALS

544

Jood (S) and Kapoor (AC). **Effect of storage and insect infestation on protein and starch digestibility of cereal grains.** *Food Chemistry* 44(3); 1992: 209-212

Protein and starch digestibility of wheat, maize and sorghum grains increased marginally during storage, except for starch digestibility of sorghum which increased significantly ( $P < 0.05$ ) after 4 months of storage. Protein and starch digestibility of 3 cereal grains having 25, 50 and 75% grain infestation caused by *Trogoderma granarium* Everts and *Rhizopertha dominica* Fabricius separately and in mixed form were affected significantly ( $P < 0.05$ ) and adversely. *T. granarium*, primarily a germ feeder, reduced protein digestibility of wheat and maize more than did *R. dominica* or mixed population of both insect sp. By contrast, *R. dominica*, an endosperm feeder, reduced starch digestibility of 3 cereal grains compared with *T. granarium* and mixed population. The reduction in digestibility was dependent on the distribution of proteins and starch in seed components as well as feeding preferences of insects. AA

## Barleys

545

Clarkson (SP), Large (PJ) and Bamforth (CW). **Oxygen-scavenging enzymes in barley and malt**



and their effects during mashing. *Journal of the Institute of Brewing* 98(2); 1992; 111-115

Of the enzymes that may be involved in the scavenging of oxygen radicals in barley and malt, superoxide dismutase, catalase and peroxidase all increase their specific activities during malting, whereas polyphenol oxidase decreases to zero. Of these, however, only the isoenzymes of peroxidase survive (in part) in the mash, and are responsible for the oxidation of polyphenolic materials. The concn. of hydrogen peroxide normally found in wort limits their action. Addition of hydrogen peroxide to the mash or its generation via a glucose oxidase system greatly increases haze formation, decreases the polyphenol content and causes the development of a red coloration. When the same amount of the different malt peroxidase isoenzymes was added to mashes, the intensity of the red colour varied according to the isoenzyme used. The worts produced by enhanced peroxidation afford more colloiddally stable beers. The effects however are limited by the dissolved oxygen concn. in the wort. AA

## Rice

546

Saikia (L) and Bains (GS). **Studies of some Assam rice varieties for cooking, organoleptic and visco-elastic properties.** *Journal of Food Science and Technology (India)* 30(1); 1993; 40-41

Studies of cooking, organoleptic and visco-elastic properties of 3 var. of Assam rice revealed comparatively higher cooking time, water-uptake and elongation ratio for brown and milled rice. 'Jaha', a scented var., scored highest in aroma but was inferior in terms of non-cohesiveness, integrity, alkali spreading and clearing. 'Monoharsali' and 'Prosadbhog' gave higher peak viscosity and 'Jaha' lowest gelatinization time. Correlation coeff. between amylose, fat and protein with water-uptake and elongation ratio were estimated. AA

547

Harish Chander and Berry (SK). **Potential of storage insect pests to breed in traditional products of rice.** *Journal of Food Science and Technology (India)* 30(1); 1993; 60-61

Breeding potential of *Tribolium castaneum*, *Rhyzopertha dominica* and *Sitophilus oryzae* in salted *parmal*, puffed rice and beaten rice showed that mortality of adult insects was negligible during 3 wks in all products except for full mortality of *S. oryzae* on beaten rice in 2 wks. Larval development of *T. castaneum* was significantly slower in salted *parmal* and *phullan* as compared to that in raw rice.

The larvae of *R. dominica* took significantly longer time to develop in salted *parmal*. *T. castaneum* produced lowest progeny in salted *parmal* and sweetened *phullan*, whereas *R. dominica* produced max. progeny in plain and sweetened *phullan* causing 27.9 and 19.5% loss in wt. respectively during 3 months. The rice weevil, *S. oryzae*, could not breed in any of the traditional products of rice tested in this study. AA

548

Narpinder Singh, Baljit Singh and Sekhon (KS). **Relationship between fissured kernels and cooking characteristics of rice.** *Journal of Food Science and Technology (India)* 30(1); 1993; 68-69

Regression models to predict relationship between % fissured kernels and cooking characteristics of rice have been formulated. Gruel solid loss and alkali spread value were correlated positively to fissured kernels with correlation coeff. of 0.66 to 0.93 and 0.94 to 9.6, respectively, for various var. Water uptake and cohesiveness scores were correlated negatively to % fissured kernels with correlation coeff. in ranges of 0.71 to 0.86 and 0.65 to 0.81, respectively. AA

549

Sajwam (KS), Kaplan (DI), Mittra (BN) and Pande (HK). **Milling quality of rice as influenced by time of harvesting and storage conditions.** *Tropical Agriculture* 69(3); 1992; 296-300

Harvesting of Jaya, Pusa 2-21 and Ratna rice var. 32 days after flowering gave the highest yield. The storage time and duration did not affect the grain protein and mill yield. Paddy stored in metal drums resulted in grain hardness than bamboo mud-plastered bin or gunny bag storage. The gunny bag storage resulted in rapid fall in seed viability in terms of germination percentage. SD

550

Agnihotri (NP) and Yadav (TD). **Determination of residues of deltamethrin on rice and wheat stored under Food Corporation storage system.** *Bulletin of Grain Technology* 29(1); 1991; 6-8

Wettable powder (2.5%) of deltamethrin (K-othrine) was sprayed on rice and wheat stacks in jute bags with an expected deposits of 10 and 20 mg/m<sup>2</sup> respectively. GLC analysis of insecticide residues showed that all the samples of rice and wheat were free from deltamethrin residue, except 1 cm deep samples of rice which gave 0.02 p.p.m. residue. GS



## Rice bran

551

Bera (MB). **Use of deoiled rice bran: Present status and future possibilities.** *Indian Food Industry* 11(3); 1992; 36-38

Aspects covered are the nutritional significance of deoiled rice bran, food uses of rice bran, rice bran protein conc. and its functional properties (nitrogen solubility, emulsifying capacity, foaming capacity and flow behaviour properties) and the nutritional significance of deoiled rice bran protein conc. CSA

## Wheat

552

Joshi (BC), Prajapati (SK), Srivastava (JL), Lal (S) and Yadav (AS). **Studies on quality of rain affected wheat crop in Mathura district of UP.** *Bulletin of Grain Technology* 29(1); 1991; 42-45

Unseasonal rain affected samples of wheat (500 g each) collected were analysed for physical quality parameters like foreign-matter, other food grains, damaged grains, slightly damaged grains, shrivelled and broken, weevilled and lustre loss, moisture content, germination, fungi and aflatoxin contamination. Results indicated that it is necessary to do thorough quality assessment of those food grains which are affected with rain during harvesting. The lustre loss was between 40 and 100%. All the other refractions like foreign matter, other food grains, damaged grains were in high proportion. 12 fungi were identified and *Aspergillus flavus* was found in all samples. About 33.3% samples were contaminated with aflatoxin B<sub>1</sub>. GS

553

Singh (YP) and Mall (NP). **Effects of various grain protectants on germination and damage of wheat grains by *Sitophilus oryzae* Linn.** *Bulletin of Grain Technology* 29(1); 1991; 50-54

Comparative efficacy of oil and cake of castor (*Ricinus communis*), neem (*Azadirachta indica*), mustard (*Brassica juncea*), linseed (*Linum usitatissimum*) and powders of *Ipomea carnea* and *Melia azedarach* was evaluated as grain protectants against *Sitophilus oryzae* Linn. infesting stored wheat under lab. conditions (27 plus or minus 1°C temp. and 75 plus or minus 5% RH). The viability of wheat grains ranged from 83.97 to 94.25% and none of the treatment affected it adversely. Significantly less number of beetles were obtained in the grains treated with neem oil (7.66) which was followed by *I. carnea*, *M. azedarach* and neem cake being 14.33, 16.00 and 17.33 respectively. The

grain damage as well as loss in wt. were min. in neem oil treated grains (6.66 and 3.54%, respectively). The seeds treated with neem cake, linseed oil, *I. carnea* and *M. azedarach* also proved effective in comparison to untreated ones. GS

554

Patnaik (G). **Export potential for wheat and wheat products.** *Indian Miller* 22(6); 1992; 31-34

World production of wheat, domestic consumption (per capita net availability of food grains in India), export potential for wheat and flour from India are covered. SRA

## Wheat flour

555

Prieto (JA), Ebri (A) and Collar (C). **Optimized separation of nonpolar and polar lipid classes from wheat flour by solid-phase extraction.** *Journal of the American Oil Chemist's Society* 69(4); 1992; 387-391

A method combining solid-phase extraction on prepacked silica and aminopropyl bonded-phase (Bond-Elut) columns has been developed for the separation of neutral lipids, glycolipids and phospholipids from wheat flour into individual classes in high yield and homogeneity. Chromatography on a single silica column (500 mg) with solvent combinations of increasing polarity resulted in complete separation of steryl esters, triglycerides, free fatty acids, 1,2-diglycerides, 1,3-diglycerides, monoglycerides, monogalactosylglycerides, digalactosylglycerides, phosphatidylcholine and lysophosphatidylcholine. Chromatography on an aminopropyl bonded-phase column (500 mg) with ternary mixtures of chloroform/methanol/ammonium hydroxide led to the proper separation of N-acyl-phosphatidylethanolamine and N-acyl-lysophosphatidylethanolamine, previously coeluted on the prepacked silica column. Cross contamination among phospholipid classes tested by normal-phase HPLC was always < 14%. AA

556

Conforti (FD) and Johnson (JM). **Use of the farinograph in predicting baking quality of unchlorinated and chlorinated flours.** *Journal of Food Quality* 15(5); 1992; 333-347

The viscoelastic properties of 6 soft wheat flour (Coker 916), chlorinated and unchlorinated, and their baking properties were analysed. Chlorination increased the absorbency of the flour resulting in a stable product with firmer crumb. The stability,



mixing tolerance index and peak time showed significant correlation with baking quality which could predict the quality of chlorinated flour. SD

## MILLETS

557

Hadimani (NA) and Malleshi (NG). **Studies on milling, physico-chemical properties, nutrient composition and dietary fibre content of millets.** *Journal of Food Science and Technology (India)* 30(1): 1993; 17-20

Pearl millet and small millets were studied for milling characteristics and the milled fractions were analysed for chemical composition and dietary fibre content. The milled grains were also evaluated for cooking quality. The yields of milled grains, bran and husk varied from 63.2 to 90.0%, 5.0 to 11.0% and 1.5 to 29.3% respectively. Milled grains contained about 90 and 70% of the grain protein and grain fat, respectively. The oil contents of the bran from pearl, finger and other small millets were 15, 3 and 23 - 27% respectively. The total dietary fibre contents of milled grains ranged from 9 - 16% out of which 32 - 50% was soluble dietary fibre. Milled millet grains cooked soft within a short period when added to boiling water. The Brabender visco-amylograms of milled millet flour indicated a gelatinisation temp. of about 75 plus or minus 2°C, peak viscosity of 220 - 560 BU, breakdown viscosity of 20 - 120 BU and cold paste viscosity of 340 - 1120 BU. AA

## Corn

558

Singh (KN), Tiwari (R) and Lal (S). **Studies on losses in maize in relation to storage structures in the villages of district Udaipur (Rajasthan).** *Bulletin of Grain Technology* 29(1): 1991; 3-5

Maize stored for 4 and 8 months in (i) kachcha kothi (mud structure), (ii) pucca rothi (Bakhari stone slab structure) and (iii) metal bin/drums, were analysed for moisture, germination % and wt. loss. Max. storage loss was in (i) and the min. in (iii). Wt. loss and moisture increased with the storage period; and germination was unaffected. GS

559

Dakshinamurthy (A). **Pre-harvest spray of insecticides in maize for the management of *Sitotroga cerealella* Olivier in storage.** *Bulletin of Grain Technology* 29(1): 1991; 63-64

Four pre-harvest sprays on the management of *S. cerealella* Olivier in the storage of maize viz. (i) endosulphan 0.05% (T<sub>1</sub>), (ii) malathion 0.05% (T<sub>2</sub>), (iii) dichlorvos 0.05% (T<sub>3</sub>), (iv) etrimphos 0.05% (T<sub>4</sub>) and (v) control water spray (T<sub>5</sub>) showed that they were significantly better than control in preventing *S. cerealella* in maize. Etrimphos 0.05% spray was most effective. GS

## Sorghum

### Sorghum flour

560

Anju Rao and Vimala (V). **Efficacy of tricalcium phosphate on the storage quality of sorghum flour.** *Journal of Food Science and Technology (India)* 30(1): 1993; 58-59

The efficacy of tricalcium phosphate (2%) as pre-storage treatment in whole and dehulled sorghum flour has been studied. Treatment with tricalcium phosphate controlled insect infestation and associated changes in fat acidity, alcoholic acidity, and lipase activity. A positive correlation between fat acidity and lipase activity was observed. Dehulling prior to milling contributed to better storage quality. AA

## PULSES

### Blackgram

561

Krishna Rao (V), Ratnasudhakar (T) and Sreeramamurthy (K). **Effect of storage structures on grain mycoflora and viability of blackgram during storage.** *Bulletin of Grain Technology* 29(1): 1991; 9-13

*Buttaminumu* and *Netminumu*, two var. of blackgram (*Phaseolus mungo*) were stored upto 150 days in (i) jute gunny bag (polyethylene lined), (ii) jute gunny bag, (iii) nylon gunny bag and (iv) steel bin in Bapatla mandal, Guntur, Andhra Pradesh. Moisture contents of *Buttaminumu* and *Netminumu* ranged from 8.0 to 11.2% and 8.1 to 12.7% respectively for the whole period indicating that moisture was not influenced by the type of storage structure or the var. However, moisture content decreased in all the storage structures up to 120 days and increased at 150 days due to changes in atmospheric temp. and RH. *Buttaminumu* and *Netminumu* stored in steel bin and nylon gunny bag recorded highest germination respectively. Seed borne fungi was less in both var. stored in jute gunny bag. GS



## Cowpeas

562

Uzogara (SG) and Ofuya (ZM). **Processing and utilization of cowpeas in developing countries: A review.** *Journal of Food Processing Preservation* 16(2); 1992; 105-147

In this review methods of circumventing constraints to cowpea (*Vigna unguiculata* and *Vigna sinensis*) utilization such as pest infestation beany flavours and odour, presence of antinutrients and extended cooking times are outlined. Milling or grinding, dehulling, soaking germination (sprouting), fermentation, heat treatment techniques, alkaline treatment and popular cowpea foods (akara-deep-fat-fried bean balls, moin-moin-steamed cowpea paste, ewa-ibeji boiled cowpeas, awuje-soft boiled cowpeas, danwake-cowpea dumplings, begiri-cowpea soup, cowpea spread, roasted cowpea, baked cowpea products, infant weaning foods, extruded cowpea products, fermented cowpea products, germinated cowpeas, ready-to-eat cowpea foods) are reviewed. Use of cowpea in infant and adult foods in traditional and novel products is recommended to combat malnutrition. 187 references. SD

## Dry beans

563

Del Valle (JM), Stanley (DW) and Bourne (MC). **Water absorption and swelling in dry bean seeds.** *Journal of Food Processing Preservation* 16(2); 1992; 75-98

A modified first-order reaction model composed of an initial linear phase followed by a diffusion-controlled phase closely predicted water absorption and swelling in several var. of fresh and stored beans. Dehulling resulted in increased rates of water absorption, but equilibrium values for both water absorption and swelling were reduced as a result of elimination of water held between the seed coat and the cotyledons as well as between the cotyledons. Swelling of dehulled seeds was reduced initially, since the seed coat swells faster than the cotyledons in the initial stages of water uptake. Addition of carbonate salt to the soaking sol. generally reduced water absorption and swelling. The hard-to-cook defect was manifested by reductions in the rates of water uptake and diminished effects of dehulling and salt soaking on water absorption and swelling. Water absorption was significantly and negatively correlated with cooked bean hardness. AA

## Fababeans

## Fababean proteins

564

Schwenke (KD), Anders (K), Junker (B) and Schneider (Ch). **Chemical and gel electrophoretic characterization of acetylated fababean protein isolates.** *Die Nahrung* 35(7); 1991; 759-766

The extent of modification of amino and hydroxyl groups in acetylated faba bean protein isolates was determined. Gel electrophoretic studies of unmodified and acetylated fababean legumin and protein isolates were carried out in acidic and alkaline buffer systems as well as in a SDS-containing system. A remarkable increase of O-acetylation was found after the N-acetylation has reached a degree of about 60%. Structure changes of the proteins were indicated from the gel electrophoresis patterns in the same region of modification. The quantity of acetyl residues fixed on hydroxyl groups in exhaustively modified protein isolates corresponds to 40% of the total amount of acetyl groups introduced into the proteins. The SDS electrophoresis of the acetylated legumin protein isolates revealed a remarkable increase of the molecular mass of the acidic  $\alpha$ -polypeptide chains only, which is an experimental proof of a preferential acetylation of the latter ones. This gives confirmation of the structural model in which the  $\alpha$ -chains are proposed to be situated on the surface of the protein. AA

## Green gram

565

Ramzan (M), Judge (BK) and Chahal (BS). **Use of wood ash and saw dust for the protection of green gram against pulse beetle, *Callosobruchus maculatus* (L.).** *Bulletin of Grain Technology* 29(1); 1991; 61-62

Covering of green gram with layers of varying thickness of saw dust and wood ash was tried and multiplication of *C. maculatus* (L.) were recorded at 1, 2, 4 and 6 months after release of the pairs. There was no multiplication of the pest or grain damage even in 1 cm layer of wood ash or saw dust, while in the control group, the mean number of adults emerged were 15, 55 and 166 during 2, 4 and 6 months storage respectively. GS

## Red gram

566

Mulimani (VH) and Paramjyothi (S). **Effect of heat and UV on trypsin and chymotrypsin inhibitor activities in red gram (*Cajanus cajan*, L.).** *Journal*



of Food Science and Technology (India) 30(1): 1993; 62-63

Red gram seeds were analysed for trypsin and chymotrypsin inhibitor activity and the effects of heat treatment as well as UV exposure on the activities of these anti-nutritional factors. Heat treatment and UV exposure decreased the activities of both trypsin and chymotrypsin inhibitors. Proteinase inhibitors of red gram were found to be heat labile. AA

## OILSEEDS AND NUTS

567

Bhakare (HA), Kulkarni (AS) and Khotpal (RR). **Lipid composition of some seeds of central India.** *Journal of Food Science and Technology (India)* 30(1): 1993; 54-55

Total lipid content of *Acacia catechu*, *Lepidium sativum*, *Nigella sativa* and *Swietenia mahaganii* seeds were 5.7, 13.8, 31.8, 59.4% on dry wt. respectively. Neutral lipids were found to be predominant, while the glycolipids and phospholipids were present in lower quantities. Glycolipids consisted of monogalactosyl diglyceride, digalactosyldiglyceride, acylatedsteryl galactoside and steryl galactoside, while the phospholipids comprised of phosphatidyl choline, phosphatidylethanolamine, phosphatidylinositol, candiolipin and phosphatidylglycerol. Lysophosphatidylethanolamine and lysophosphatidylcholine were present in small amounts. AA

## Coconuts

### Coconut water

568

Maciel (MI), Oliveira (SL) and Da Silva (IP). **Effects of different storage conditions on preservation of coconut (*Cocos nucifera*) water.** *Journal of Food Processing Preservation* 16(1): 1992; 13-22

This study reports the effects of storage temp. (4, 12, 22 and 28°C), time and packing type (with and without polyethylene) of coconuts on coconut water (CW). CW from 6 wrapped and 6 unwrapped coconuts at day 1 and on wks 2, 3, 4 and 5 was taken for physico-chemical (°Brix, total acidity, pH and wt.), microbial and sensory analysis. Acceptability of CW was not affected ( $P < 0.05$ ) by the storage system for 2 wks. The acceptability scores for CW showed higher ( $P < 0.01$ ) values for CW in polyethylene wrapped coconut at 12 and 22°C for 3

wks of storage than those at 4°C. The acceptability scores for CW were higher ( $P < 0.01$ ) for those stored wrapped coconuts at 22°C and those stored unwrapped coconuts at 4°C than other storage systems. Polyethylene-wrapped coconuts stored at 12°C for 4 wks were in better condition than those exposed to the other treatments. BV

## Cottonseeds

### Cottonseed proteins

569

Cho (KC), Park (PSN), Adams (ET) and Rhee (KC). **A simple, rapid and simultaneous preparation of glandless cottonseed 7S and 11S protein fractions and characterization of some physicochemical properties.** *Journal of Food Quality* 15(5): 1992; 357-367

Glandless cottonseed storage proteins yielded 7S and 11S protein fractions of high purity by chromatographic fractionation (rigid and fine gel, sephacoyl S-300 HR). Their physicochemical properties agreed well with literature values. The procedure is superior to all other existing lengthy and cumbersome procedures. SD

## Groundnuts

570

Singh (Y) and Ansari (SU). **Farmers level survey on insects and mites on stored groundnut in Andhra Pradesh.** *Bulletin of Grain Technology* 29(1): 1991; 14-21

The major pests with stored groundnut (*Arachis hypogea* L.) in pods and kernels are identified and their infestation intensity during pre-sowing and post-harvest sowing. Insects like *Corcyra cephalonica* Staint, *Tribolium castaneum* (Hbst.), *Rhizopertha dominica* (F), *Oryzaephilus surinamensis* (L.), *Ephestia cautella* (Walk), *Caryedon serratus* (Ol) and a mite *Acarus siro* (L) were commonly found in all stored groundnut pods and kernels. Infestation intensity was max. with *Acarus siro* (L) followed by *Oryzaephilus surinamensis* (L) and *Tribolium castaneum*. GS

571

Smith (JSJr) and Sanders (TH). **Moisture content and storage system effects on peanut quality and milling parameters.** *Oleagineux* 46(3): 1991; 121-124

Initial groundnut kernel moisture content (MC) and warehouse ventilation type showed little effect on final MC, shelling rate, shelling efficiency, free fatty



acid value and carbonyl content of groundnuts. Decreases in kernel MC did result in increased split kernel outturn during shelling as well as changes in percentages of individual kernel size categories. Properly designed and maintained warehouses with either mechanical or natural ventilating systems have the capacity to protect groundnut quality throughout the normal storage season with little effect on milling parameters. BV

## Niger

572

Choudhary (PL), Geda (A), Sawarkar (NJ) and Sharma (YK). **Nutritive value of niger varieties.** *Indian Journal of Nutrition and Dietetics* 27(6); 1992; 181-185

Proximate composition of niger seed var., N-5, N-35, N-71, IGP-76 and CHH-1 and their oil quality and nutritive value of cake are reported. Var. N-5 and N-71 showed low free fatty acid content, and better keeping quality than other var. Ca and phytic acid contents were lowest in N-5 and highest in IGP-76 and CHH-1. Ash content was max. in N-71 and low in N-5. Protein content was max. (37.48%) in N-5 and min. (33.68%) in IGP-76. Oil content of var. was 40.29 to 47.02% and max. (47.02%) in CHH-1. GS

## Safflower seed

573

Charjan (SKU) and Tarar (JL). **Effect of container and storage period on storability of safflower (*Carthamus tinctorius*) seed.** *Indian Journal of Agricultural Sciences* 62(8); 1992; 560-562

Safflower seeds, dried to 7% moisture were packed in jute bag, cloth bag and polyethylene bag of 700 guage and stored for 18 months at 10.6 - 43.4°C and 35.8 - 87.3% RH. Seed moisture, germination %, seedling length, seedlings dry wt. and field emergence of seedlings were noted at 3 months intervals. % germination after the storage was 50.0 for cloth, 59.9 for jute and 81 for polyethylene bag stored seeds. Max. period (months) the seeds could be stored was 15 in polyethylene, 9 in cloth and 6 in jute bag. Seedlings from polyethylene bag stored seed were vigorous, had higher dry wt. and length. KAR

## Soybeans

574

Fujita (S) and Suzuki (K). **Enhanced surface activity of food surfactants by addition of soya lysophospholipids.** *Journal of Japanese Society for*

*Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 39(2); 1992; 151-160 (Ja)

Surface activities of food surfactants (emulsifiers), such as sucrose fatty acid ester (SE), polyglycerin fatty acid ester (PGE) and sorbitan fatty acid ester (SOE), were found to be enhanced by blending with soya lysophosphatidylcholine (LPC) or soya lysophospholipids (SLP). The water solubility and acid/salt tolerance of SE and PGE of medium HLB value and of SOE increased due to addition of 20 - 50% (w/w) LPC or SLP. Surface tension of the mixtures (food surfactant/LPC or SLP) took a min. value in a range of ratios from 60:40 to 50:50 (w/w), while a notable decrease of surface tension could be observed by mixing 10 - 30% (w/w) of SLP having about 50% LPC. Immersional wettability (penetrating power) of food surfactants increased with addition of 10 - 20% LPC. Oil/water (o/w) emulsifying ability of food surfactant was fortified by mixing 20 - 30% of LPC or SLP, and the emulsions of vegetable oil became tolerant to salt and acid solution. Water dispersibility of fine particles and  $\beta$ -carotene solubilization of food surfactants were also improved by addition of about 20% LPC or SLP. The results obtained may be brought by the following reason: The nonionic surfactant incorporate with LPC molecules, which have strongly hydrated head group, to form the mixed micelles which possess a similar property to that of small micelles of LPC. AA

575

Srinivas (H), Bhagya Swamylingappa and Nagin Chand. **Secondary extraction of soybeans using hexane-acetic acid: Effect on beany flavour removal and physicochemical properties.** *Journal of Agricultural and Food Chemistry* 40(2); 1992; 276-279

Sensory and physicochemical characteristics of soy meal obtained after secondary extraction of soy flakes using hexane containing 3 and 5% acetic acid were compared with those of hexane-extracted meal. Sensory evaluation study using the threshold dilution technique showed a 55 - 63% reduction of beany flavour in treated meals. Hexane containing 5% acetic acid treatment showed total inactivation of lipoxygenase (L-1 and L-2 + L-3), but no effect on trypsin inhibitor activity. Compared to hexane-extracted meal, the nitrogen solubility index of hexane containing 3 and 5% acetic acid extracted meal showed reductions of 19 and 39%, respectively. *In vitro* digestibility increased in treated samples (81.7%) as compared to that of hexane-extracted meal (76.7%). Gel filtration, polyacrylamide gel electrophoresis, and fluorescence emission spectrum indicated the dissociation of proteins into lower mol. wt. protein fractions in treated meals; the



higher the concn. of acetic acid in hexane, the greater was the extent of dissociation. AA

## Soy products

### Soy flour

576

Sinha (LK) and Nawab Ali. **Preparation of medium fat-soy flour at small scale.** *Journal of Food Science and Technology (India)* 30(1); 1993; 14-16

Process for partial extraction of oil using an expeller and production of flour from partially deoiled soy cake has been developed. The process consists of cleaning, dehulling and splitting of soybean, steaming and flaking of soysplits, deoiling of flakes in a screw press and grinding of edible cake to flour which has < 6% oil and about 50% proteins. The process is potential for producing oil as well as protein-rich flour on a small scale. AA

577

Krishna Jha and Bargale (PC). **Chemical and microbial changes in full-fat soy flour during storage in different packaging materials.** *Journal of Food Science and Technology (India)* 30(1); 1993; 56-57

The changes in total bacteria, lipolytic bacteria, yeast and mould counts, moisture and free fatty acids of full-fat soy flour (FFSF), when stored at 38°C and 90% RH in jute cotton bags, metal containers (tins), LDPE and laminated Al foil packs, have been studied. Moisture impermeable metal containers and laminated Al foil packs gave max. protection to FFSF under above conditions, while jute cotton bags were found to be unsuitable. AA

## TUBERS AND VEGETABLES

### Onions

578

Tyagi (RPS), Bansode (PC) and Lal (S). **Problem of onion storage.** *Bulletin of Grain Technology* 29(1); 1991; 57-60

The factors affecting the storability of onion, such as bulb size, extent of handling injury, variation in atmospheric temp. and RH in storage and storage structures are reviewed. Storage loss ranged from 25 - 50% depending upon weather, var. and type of storage structures. Drying losses during storage ranged from 20 to 30%. Major causes for losses were

sprouting and rotting which could be minimised by careful handling and storage. GS

### Carrots

579

Bolin (HR). **Retardation of surface lignification on fresh peeled carrots.** *Journal of Food Processing Preservation* 16(2); 1992; 99-104

A 20 - 45 second dip in a 60°C, pH 1.0 solution, which could be easily incorporated into the production system, inhibits the development of a white material on the surface of freshly peeled carrots, retaining the original colour and flavour. SD

### Cassava

580

Almazan (AM). **Influence of cassava variety and storage on garl quality.** *Tropical Agriculture* 69(4); 1992; 386-390

Garl, a partially gelatinized dry cassava meal, prepared from 35 clones, showed that the swelling capacity in water at room temp. and in water initially at 90 - 95°C crude fibre concn., garl pH, eba pH and stickiness were significantly different between the samples. Swelling capacity was influenced by crude fibre and protein contents, gel consistency in water and in KOH and amylograph consistency of the paste. Garl with < 10% moisture stored in plastic bags at 25 plus or minus 2°C for 2 - 40 wks showed decreased cyanide concn. and less eba stickiness. SD

### Potatoes

581

Hallberg (ML) and Lingnert (H). **Lipid oxidation in potato slices under conditions simulating the production of potato granules.** *Journal of the American Oil Chemist's Society* 68(3); 1991; 167-170

The formation of volatile compounds in potato slices was analyzed by means of GC headspace analysis. The experimental variables selected for the treatment of the potato slices were chosen to simulate the conditions during the first stages of an "add-back type" of process for production of potato granules. The potato slices (2 cm thick) were exposed to air of low temp. (4°C) and water at blanching temp. (76°C). Both the surface and the middle of each slice were analyzed for volatile compounds. Hexanal was the most abundant aldehyde formed. At the elevated temp., in particular, there was an obvious formation of



hexanal. After 15 min of blanching, the amount of hexanal was higher in the middle of the slices than at the surface. This difference in hexanal concn. was probably due both to the leakage of hexanal into the blanching water from the surfaces of the potato slices, and to the inactivation of lipoxygenase at the surfaces which prevented further oxidation during the subsequent chilling period. The hexanal formation indicates that lipid oxidation occurs during the process. The formation of other volatile compounds also is discussed. AA

582

Kida (Y), Honda (N), Uchida (M), Kunisada (Y) and Fukuda (M). **Changes in ascorbic acid content and several enzyme activities concerning synthesis and metabolism of ascorbic acid in potatoes during storage.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(2); 1991; 160-165

Ascorbic acid content and several enzyme activities related to biosynthesis and metabolism of ascorbic acid, namely L-gulonolactone oxidase, monodehydroascorbate reductase, dehydroascorbate reductase, peroxidase, ascorbate oxidase and polyphenol oxidase, in potato tubers were examined to clarify the relationship between physiological conditions of stored potatoes and their ascorbic acid content. During the first month of storage, ascorbic acid content decreased markedly irrespective of storage temp., after which the decrease became gradual. Since several related enzyme activities also changed markedly during the first month, they are assumed to affect the ascorbic acid content of stored tubers. Changes in storage temp. had little effect on these changes. This study showed that a marked change in ascorbic acid content of potato tubers occurred during the initial period of dormancy irrespective of storage temp. AA

583

Mondy (NI), Sharada (D), Munshi (CB) and Wurum (CM). **Effect of storage time, temperature, and cooking on isopropyl N-(3-chlorophenyl) carbamate levels in potatoes.** *Journal of Agricultural and Food Chemistry* 40(2); 1992; 197-199

Factors affecting the residue levels of the sprout inhibitor isopropyl N-(3-chlorophenyl) carbamate (CIPC) in potatoes were studied. Katahdin and Russet Burbank potatoes were dipped in 1% emulsion of CIPC prior to storage. The effects of storage time (1 and 3 months), temp. (5 and 20°C), and 2 methods of cooking (boiling and pressure cooking) on CIPC residue in Katahdin and Russet Burbank potatoes were studied. Tubers stored for 3 months retained lower levels of CIPC than those

stored for 1 month. Potatoes stored at 5°C contained significantly ( $p < 0.01$ ) higher levels of CIPC than those stored at 20°C. Both methods of cooking resulted in significant ( $p < 0.01$ ) losses of CIPC in the peel (periderm). However, the residue of CIPC in the cortex region (under the peel) was significantly ( $p < 0.01$ ) reduced by boiling and significantly ( $p < 0.01$ ) increased by pressure cooking. CIPC retention was significantly ( $p < 0.01$ ) higher in the Katahdin than in Russet Burbank cv. AA

## Potato chips

584

Barrera-Arellano (D) and Esteves (W). **Oxidative stability of potato chips determined by Rancimat.** *Journal of the American Oil Chemist's Society* 69(4); 1992; 335-337

The objective of this research was to assay the behaviour of potato chips in the rancimat and to determine its induction period without extraction of the lipid fraction. Detn. were carried out at 110°C and 20 L/h air flow. The curves for the ground chips were completely different from those obtained with extracted oils. Curves for fresh potato chips showed two inflection points after approx. 5 and 20 h, respectively. Sensory analyses (odor score) of samples withdrawn from the Rancimat after 0, 5, 10, 20 and 25 h showed significant differences ( $P < 0.01$ ). An odor score of 5 was considered the rejection point, and was equivalent to 10.8 h and corresponded to 150  $\mu$ S of electric conductivity. At this point the curves started to level off between the first and second inflection points. Curves obtained with potato chips stored at 25°C for 2, 4, 6, 8, 10 and 12 wk showed the same basis pattern, although prolonged storage corresponded with lower induction time. Correlation of induction values between ground potato chips and extracted oil was high ( $r > 0.87$ ). From these results, it seems that it is possible to estimate the oxidative stability of fat containing foods without prior extraction. BV

## Sweet potatoes

585

O'Neil (CA) and Schwartz (SJ). **Effect of gamma irradiation on isomerization of  $\beta$ -carotene in sweet potato.** *Journal of Food Quality* 15(5); 1992; 315-320

Irradiation of cured sweet potato roots (Georgia Reds) by  $^{60}\text{Co}$ , 500 Krad dose did not lead to isomerization of all-*trans*- $\beta$ -carotene *cis* isomers of  $\beta$ -carotene have lower provitamin A activities than all-*trans*- $\beta$ -carotene, above 97% of which was found in total  $\beta$ -carotene. The process did not decrease



provitamin A due to isomerization in sweet potatoes. SD

## Yams

586

Nnodu (EC) and Alozie (SO). **Using gibberellic acid to control sprouting of yam tubers.** *Tropical Agriculture* 69(4): 1992; 329-332

Yam tubers dipped in gibberellic acid sol. (GA<sub>3</sub> 150 p.p.m.) for 6 h after harvest controlled sprouting upto 45 days of storage. A tank mix of GA<sub>3</sub> could be successively used in treating batches of 21 tubers for 6 h with its sprout-controlling potency. SD

## Vegetables

### Brinjals

587

Bhupinder (K) and Harinder (K). **An improved process for ready-to-eat curried brinjal (*Solanum melongena* Linn.) preparation (Bhartha).** *Indian Food Packer* 46(3): 1992; 9-12

Bhartha was prepared from Punjab Jamuni Gola var. brinjal. Cut brinjals (15 lb/inch<sup>2</sup>) were peeled and mashed, and fried onion, ginger and tomato juice were added. The simmering hot product was filled in A-1 lacquered sterile cans and exhausted for about 10 min to reach a can centre temp. of 90°C. The cans were sealed, processed in autoclave, cooled and stored, dried at room temp. The fresh, processed and stored products were analysed for moisture, pH, TSS (°B) and % acidity. The moisture content of the edible portion of fresh, roasted and steamed brinjal was 91.2, 91.2 and 91.4% respectively. The steamed edible brinjals had high TSS, pH and acidity than raw fruits. Bhartha with an yield of 102%, had better flavour and texture. GS

### Leafy vegetables

### Spinach

588

Hisaka (H) and Ogura (N). **Relationship of changes of components to that of appearance quality of spinach. Part II. Changes in ascorbic acid contents at various parts of spinach leaves during storage.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(1): 1991; 41-43 (Ja)

The ascorbic acid contents at various parts of spinach leaves during storage were measured. The

ascorbic acid contents of spinach leaf blades were higher than those of spinach petioles, and those in the inner leaves were higher than those of outer leaves. Ascorbic acid in outer leaves decreased during storage faster than in inner leaves. The relationship between the rate of ascorbic acid reduction and storage temp. can be expressed as a following equation:  $\text{Loss\%/day} = e^{(0.102 t + 0.11)}$  where e: the base of natural logarithm, t: temp. (°C). AA

### Okra

589

Kaur (B) and Bains (GS). **Comparative studies on 'Ready-to-serve' canned okra/lady's fingers (*Hibiscus esculentus* L.) in brine and tomato juice.** *Indian Journal of Dairy Science* 46(3): 1992; 21-26

A ready-to-serve okra product was canned in tomato juice and in brine. (i) Pusa Sawani and (ii) Punjab Padmani var. of okra were canned after trimming and dicing in 3% brine with and without 0.3% citric acid and also in thinner consistency either as raw or after frying in groundnut oil with addition of tomato juice. The A-1 cans were exhausted to 90°C for brine, 85°C for tomato juice and processed at 115.5°C for 30 min. Cut out analysis of the cans incubated at 37 and 55°C was done for 15 days. The opened cans showed excellent flavour and no bulging of cans was seen. The fried product could accomodate more quantity of the vegetable. Product canned in tomato juice was superior to brine canned product. GS

### Tomatoes

590

Marlatt (C), Ho (C-T) and Chien (M). **Studies of aroma constituents bound as glycosides in tomato.** *Journal of Agricultural and Food Chemistry* 40(2): 1992; 249-252

Glycosidically bound volatiles in fresh tomato have been studied. The glycosides were isolated from an aqueous extract of tomatoes by adsorption onto a column of Amberlite XAD-2, followed by washing of the column with hexane and subsequent elution using methanol; the volatiles were later released from the methanol extract by enzyme-mediated hydrolysis using either a  $\beta$ -glucosidase or a pectinase. Major volatile compounds identified by GC/MS included 2-phenylethanol, benzyl alcohol, benzoic acid, and several shikimate-type products. Also found in small quantities were many monoterpene alcohols and C<sub>13</sub> norisoprenoids. The role of glycosides as possible flavour precursors in tomato is discussed. AA



591

Pal (RK) and Buescher (RW). **Respiration and ethylene evolution of certain fruits and vegetables in response to carbon dioxide in controlled atmosphere storage.** *Journal of Food Science and Technology (India)* 30(1): 1993; 29-32

Respiration was depressed by 10 - 30% CO<sub>2</sub> in ripening bananas, pink tomatoes and pickling cucumbers; increased by 20 - 30% in carrot roots and unaffected by CO<sub>2</sub> exposure in guava, orange and onion bulb. Changes in respiration seldom coincided with changes in C<sub>2</sub>H<sub>4</sub> evolution. Evolution of C<sub>2</sub>H<sub>4</sub> from guavas and tomatoes was substantially reduced by all levels of CO<sub>2</sub>. However, 30% CO<sub>2</sub>, accelerated C<sub>2</sub>H<sub>4</sub> evolution in bananas, carrot roots, cucumbers, onions and potatoes which may have been due to an early injury response. AA

592

Zosangliana and Narasimham (P). **Internal atmosphere of some fruits and vegetables.** *Journal of Food Science and Technology (India)* 30(1): 1993; 46-47

The vol. of Interstitial gases or the internal atm. of 8 types of fruits and 7 different vegetables was determined. Internal vol. of gas varied from 1.2 ml/100 g in grapes to 43.8 ml/100 g in pineapple. The oxygen content of the internal air of the fruits and vegetables held under ambient conditions ranged between 14.0 and 19.2%. AA

## Apples

593

Barwal (VS). **Effect of harvesting time and handling period on quality of apple.** *Journal of Food Science and Technology (India)* 30(1): 1993; 42-43

Fruits from 4 promising cvs ('Hardeman', 'Red Spur Delicious', 'Topred' and 'Vance Delicious') were picked on 3 dates between 110 and 125 days after full bloom and their physical and organoleptic characteristics were studied upto 21 days of handling period under ambient conditions. Harvesting dates had no significant effect on the diam. of fruits of 'Hardeman', 'Red Spur Delicious' and 'Topred'. There was significant increase in organoleptic acceptability of fruits of all cvs. Decrease in firmness and physiological wt. loss was found in late harvesting. During handling, organoleptic acceptability was at par upto 14 days in all the cvs expecting 'Vance Delicious'. AA

594

Thakur (VS) and Gupta (GK). **Persistence of dodine residue on apple (*Malus domestica*) fruits.** *Indian Journal of Agricultural Sciences* 62(8): 1992; 566-569

Pre-harvest spray of dodine (N-dodecylaguanidine acetate) was done to apple at 1.50, 3.00 and 4.50 kg/ha and the residue was analysed 1, 2, 5, 10 and 15 days after application. Mean residue content, 15 days after spray was 0.62, 1.07 and 1.32 mg/kg amounting to 82.77, 72.20 and 73.06% loss in 1.50, 3.00 and 4.50 kg/ha applications, respectively. Half life (RL<sub>50</sub>) of dodine calculated from regression coeff. was 5.82, 8.48 and 8.99 days and safe waiting period (for a tolerance limit of 2.0 mg/kg) was 4.9, 8.01 and 10.47 days for 1.50, 3.00 and 4.50 kg/ha application. Conclusion was that dodine 65 wettable powder application at 3.00 kg/ha is safe from toxic residual level with 8 days waiting period from its application. KAR

## Bananas

595

Satyan (SH), Scott (KJ) and Best (DJ). **Effects of storage temperature and modified atmospheres on cooking bananas grown in New South Wales.** *Tropical Agriculture* 69(3): 1992; 263-267

Cooking banana cvs Bluggoe, Pacific plantain, Blue Lubin and Pisang Awak stored in air and modified atm. (MA) at 28, 20, 13, 7 and 3°C showed an increased storage life by a factor 2 in the absence of ethylene absorbent and a factor of 3 when KMnO<sub>4</sub> on aluminium oxide was present. Reducing the temp. from 28 to 13°C further increased the storage. Bluggoe was more susceptible to chill injury and Pisang Awak the least. The dessert cv. Williams was more susceptible than cooking banana cvs. The MA with or without ethylene had no effect on chill injury. SD

## Kinnow mandarins

596

Nagar (PK). **Effect of different harvesting periods on shelf-life and quality of Kinnow fruits.** *Journal of Food Science and Technology (India)* 30(1): 1993; 44-45

The Kinnow mandarin fruits were harvested at different periods and stored at ambient temp. (15 - 20°C) to evaluate their shelf-life and quality. Delaying harvesting beyond 2nd wk of January was found to result in greater loss of fresh wts. than the fruits harvested earlier. While the fruits harvested



in the last wk of December and middle of January showed 11.60 and 13.10% losses during 25 days of storage, the corresponding losses in fruits harvested in 3rd and 4th wk of January were 20.60 and 25%, respectively. Total soluble solids and sugars gradually increased during storage irrespective of harvesting dates and storage. Ascorbic acid and juice contents decreased sharply during storage in fruits harvested after 2nd wk of January. AA

## Litchi

597

Singh (S), Randhawa (JS), Grewal (GPS) and Sharma (RC). **Effect of post-harvest application of fungicides on the cold storage (*Litchi chinensis* Sonn) cv. Calcutta.** *Indian Food Packer* 46(3); 1992: 13-15

Litchi fruit of cv. Calcutta was dipped in separate solutions of 2, 4 and 6% thiourea for 8 min; 125, 250 and 500 p.p.m. of Bavistin (methyl-2-benzimidazole carbonate) for 2 min; 1, 2 and 3% of sodium hypochlorite and 0.25, 0.5 and 1% of copper sulphate for 2 min. Among the different treatments fruits dipped in thiourea were excellent in taste and flavour even after 20 days in cold storage. The physiological loss in wt. of fruits dipped in thiourea was 1.3 to 1.4% which was 5.0% in untreated fruits. TSS was more and acidity was less in all treated fruits. Dipping in 4% thiourea solution for 8 min gave max. storage of 20 days in cold storage with best retention of colour, dessert quality and min. wt. loss. GS

## Mangoes

598

Ramteke (RS), Gurudutt (KN) and Eipeson (WE). **Studies on the changes in the volatile aroma composition of Alphonso mango pulp as affected by aroma recovery process.** *Journal of Food Science and Technology (India)* 30(1); 1993: 48-49

Aroma distillates of fresh mango pulp, obtained by vacuum distillation and by using aroma recovery unit, were analysed by GC-MS. A total of 14 components were identified in vacuum distillate, of which 10 were carbonyls, 3 alcohols and 1 hydrocarbon  $\beta$ -myrcene. Conc. of 2-methyl propan-1-al, 2-methyl propan-1-ol and myrcene were lower in aroma conc. obtained by using aroma recovery unit. AA

## Oranges

599

Usai (M), Arras (G) and Fronteddu (F). **Effects of cold storage on essential oils of peel of Thompson Navel oranges.** *Journal of Agricultural and Food Chemistry* 40(2); 1992: 271-275

Thirty-three constituents accounting for 96.64% of total volatiles of Thompson Navel orange peel oils have been identified and quantified in a single GC capillary run. The quantitation was performed using appropriate response factors and identification using pure samples and GC-MS. After identification, experiments were carried out to test qualitative and quantitative differences on essential oils of peel of Thompson Navel oranges stored under different cold-storage conditions. During storage at a constant temp. of 6°C and at a cyclic temp. of 6 days at 2°C plus 1 day at 14°C, an increase of volatile compounds (acetaldehyde, formic acid, formaldehyde, and acetic acid) and a decrease of limonene content was observed. The cold-storage trials with Thompson navel oranges showed that the minor variations in the content of essential oils were obtained using cyclic temp. storage with short cycles: 6 days at 6°C plus 1 day at 14°C and 18 days at 6°C plus 7 days at 14°C. AA

## Raisins

600

Sharma (PC), Sharma (KD) and Prashar (RS). **Prospects of raisin production in tribal areas of Himachal Pradesh.** *Indian Food Packer* 46(3); 1992: 16-19

Process and production cost of raisin by sun-drying and solar drying are discussed. Rs. 8225 and Rs. 8772 are required to produce 110 kg raisin by sun-drying and solar dehydration, respectively. A sum of Rs. 9775 and Rs. 10,650 are raised by selling the raisin at wholesale rates, indicating its technoeconomic profitability. Sun-drying is done by spreading the grape bunches in open sun on roof tops or floor using pine needles/gunny bags or mats. After 8 - 10 days drying, berries are separated from bunches, sorted and packed in gunny bags/wooden boxes. Solar dehydration improved the quality of the product and efficiency of the process. Solar dehydrator used is an enclosed rectangular box 6 x 3 x 1 cft internal dimensions, made up of wood thermocol and tin sheet. The is raised to 4 ft at one end. Top is covered with a glass sheet and inner sides are painted black. Air inlet and outlet are provided at the lower and upper ends respectively. GS



## Strawberries

601

Lee (YC) and Lee (SH). **Flavour quality of concentrated strawberry pulp with aroma recovery.** *Journal of Food Quality* 15(5); 1992; 321-332

The serum portion of strawberry pulp separated by centrifugation at 9000 g for 5 min was conc. 5-folds at 55 - 58°C and 30 - 40 mm Hg with aroma recovery. The conc. serum, aroma fraction and insoluble pulp were mixed to make 2-fold conc. strawberry pulp. Significant improvement in flavour quality of conc. strawberry pulp by addition of aroma fractions was established by GC, GC/MS and sensory analyses. A 10% aroma recovery appeared to be suitable for the efficient concn. of strawberry pulp. SD

## Water melon

602

Wyllie (SG) and Leach (DN). **Sulphur-containing compounds in the aroma volatiles of melons (*Cucumis melo*).** *Journal of Agricultural and Food Chemistry* 40(2); 1992; 253-256

The incidence of 6 thioether esters, methyl (methylthio)acetate, ethyl (methylthio)acetate, 2-(methylthio)ethyl acetate, methyl 3-(methylthio)propanoate, ethyl 3-(methylthio)propanoate, and 3-(methylthio)propyl acetate, considered to be of importance to the aroma profiles of *Cucumis melo* fruit, has been surveyed in a wide range of cvs. Their presence and concn. appear to be under genetic control since there are marked differences between cvs. The concn. of these compounds have been determined in a number of cvs and some have been shown to have odour values which indicate that they contribute to the overall aroma perception of the ripe fruit. AA

## CONFECTIONERY, STARCH AND SUGAR

### Confectionery

#### Chocolates

603

Harris (NE), Segars (RA) and Robertson (MM). **Storage stability of chocolate caramel rolls.** *Manufacturing Confectioner* 72(2); 1992; 51-54

Storage of the candy at 38°C in sealed flexible barrier packs exhibited acceptable rating even when stored for 6 months at this accelerated temp. Acceptance

ratings at 6 months were 3.1 without a barrier pack and 7.0 with the barrier pack. Packaging in air packs is preferred over vacuum packaging because at 38°C under vacuum the wrapper sticks to the candy. BV

## BAKERY PRODUCTS

### Biscuits

604

Srivastava (AK) and Haridas Rao (P). **Studies on low-fat soft dough biscuits.** *Journal of Food Science and Technology (India)* 30(1); 1993; 21-24

Studies on reduction in fat from 20 to 7.5%, in soft dough biscuits, indicated decrease in spread from 5.5 to 5.15 cm and increase in hardness from 0.9 to 1.3 kg/biscuit. In addition, the overall quality score decreased from 48.5 to 30.0. Further reduction in fat adversely affected machinability of the dough. The adverse effects were considerably lower with bakery shortening as compared to other fat or oil. Lecithin at 0.5% was found to be most effective for improving the overall quality of low-fat biscuits. The crispness of low-fat biscuits could also be improved by incorporating flaked rice flour at 5% level. AA

### Bread

605

Rama (MB). **Processing stages of breadmaking.** *Indian Miller* 22(6); 1992; 15-19

The rationale behind the various steps in bread making and the conditions prevailing under each step is described. These include, sieving, preparation of yeast solution, dough mixing procedure and period of mixing, dough temp. and its calculation, changes in fermentation, knock back dough make up, panning, final proof, baking, steaming and cooling. Chemical changes occurring during these steps are described briefly. SRA

## MILK AND DAIRY PRODUCTS

606

El-Gazzar (FE) and Marth (EH). **Ultrafiltration and reverse osmosis in dairy technology: A review.** *Journal of Food Protection* 54(10); 1991; 801-809

Review covers ultrafiltration (introduction and definition), composition and characteristics of retentate derived from ultrafiltered milk (milk fat, protein, minerals, lactose, vitamins, viscosity,



texture), starter activity in ultrafiltered milk, behaviour of pathogenic bacteria in ultrafiltered milk, ultrafiltered milk for making cheese (Cottage cheese, Feta cheese, Domiati cheese, Camembert cheese, Blue cheese, Mozzarella cheese, Colby and Brick cheeses, Cheddar cheese) and other dairy foods and reverse osmosis. 68 references. BV

607

Vigo (MS), Malec (LS), Gomez (RG) and Llosa (RA). **Spectrophotometric assay using O-phthaldialdehyde for determination of reactive lysine in dairy products.** *Food Chemistry* 44(5): 1992: 363-365

The results showed that O-phthaldialdehyde procedure is reliable for use even in the presence of high levels of sugars and can evaluate lysine damage after Maillard-type reactions. SD

## Milk

608

Farah (Z), Rettenmaier (R) and Atkins (D). **Vitamin content of camel milk.** *International Journal for Vitamin and Nutrition Research* 62(1): 1992: 30-33

The milk samples collected from 20 camels (*Camelus dromedarius*) were analysed for vitamin C, vitamin B<sub>2</sub> and fat-soluble vitamins E and A content. The study showed that camel milk contained less vitamin A and B<sub>2</sub> than cow's milk. Vitamin C was higher than in cow's milk and vitamin E was same as that of cow's milk. GS

609

Pearce (RJ), Dunkerley (JA), Marshall (SC), Regester (GO) and Shanley (RM). **New dairy science and technology leads to novel milk protein products.** *CSIRO Food Research Quarterly* 51(3/4): 1991: 137-144

The importance of maintaining a continuing effort in pursuit of fundamental scientific information about milk and dairy systems for the furtherance of dairy technology is demonstrated in this paper. Aspects covered are, the thermal fractionation of whey proteins, isolation of casein-derived peptide and preparation of  $\alpha$ -lactalbumin and whey lipoproteins. 7 references. SRA

610

Lederer (CL), Bodyfelt (FW) and McDaniel (MR). **The effect of carbonation level on the sensory properties of flavoured milk beverages.** *Journal of Dairy Science* 74(7): 1991: 2100-2108

Raspberry, strawberry, peach and root beer flavoured milks were carbonated at subthreshold, low, and high carbonation levels with mean carbonation vol. of < 0.60, 0.74 and 1.42, respectively. The effect of carbonation on perceived aroma and flavour by mouth attributes was determined through evaluation by a trained panel. Panelists detected a significant difference in carbonation intensity between the high carbonation level and the subthreshold and low carbonation levels. Carbonation significantly suppressed cooked milk aroma and flavour by mouth at the low and high carbonation levels, but CO<sub>2</sub> significantly enhanced sourness and astringency at the high carbonation level. Chalkiness and bitterness were rated significantly higher at the high carbonation level than at the low subthreshold levels. AA

611

Neeser (J-R), Golliard (M) and Del Vedovo (S). **Quantitative determination of complex carbohydrates in bovine milk and in milk-based infant formulas.** *Journal of Dairy Science* 74(9): 1991: 2860-2871

Milk-based infant formulas contained complex carbohydrates in amounts similar to those found in bovine milk. In whey-based raw materials, elevated levels of all bovine milk glucoconjugates and oligosaccharides were evident. BV

612

Bastian (ED), Collinge (SK) and Ernstrom (CA). **Ultrafiltration: Partitioning of milk constituents into permeate and retentate.** *Journal of Dairy Science* 74(8): 1991: 2423-2434

Retentate and permeate samples during UF and diafiltration of unacidified and acidified whole milk were collected. After analyzing retentate and permeate, the retention and recovery of fat, total N, rennet clottable N, lactose, Ca, Na, P and riboflavin was calculated. Retention depends on the permeate:retentate ratio of components. Recovery is the component amount in retentate divided by its amount in original milk. Removing permeate from unacidified milk increased retention of total N, Ca, Na, P and riboflavin. All the fat and rennet clottable N and 1% of lactose were retained. Recovery of these components ranged from 12% for lactose to 100% for fat and rennet clottable N. Retention of lactose, Na, P and riboflavin was higher during diafiltration than during UF of unacidified milk, but recovery of total N, lactose, Ca, Na, P and riboflavin was higher. Diafiltration of acidified milk decreased retention of Ca, P, Na and riboflavin compared with diafiltration of unacidified milk. Changes in constituent retention during UF processes depend on level of concn., diafiltration and acidification. Because



diafiltration and acidification influence retention and recovery of many milk components, processors can alter pH, rennetability, syneresis, and meltability of cheese (and properties of other derived products). AA

613

Rajagopalan (N) and Cheryan (M). **Total protein isolate from milk by ultrafiltration: Factors affecting product composition.** *Journal of Dairy Science* 74(8); 1991: 2435-2439

Skim milk (prepared from reconstituted NDM) was ultrafiltered by a combination of concn. and diafiltration to produce purified total protein isolates with the desired protein:lactose ratio. The rejection of protein and lactose followed expected trends. However, rejection of ash increased to 100% toward the end of the process due to insolubility of salts or their binding to proteins. At the natural pH of skim milk, the min. ash content was 7 to 8% of the retentate solids, resulting in a limiting protein content of 90%. AA

614

Anita Bansal and Singhal (OP). **Preservation of milk samples with formalin - effect on acidity.** *Indian Journal of Dairy Science* 44(9); 1991: 573-576

The titratable acidity of milk increased with the increase in formalin level and storage period. Initial increase in acidity due to reaction of formalin with milk proteins liberating hydrogen ions and on prolonged storage further increased the acidity and has been attributed to significant increase in the proteolytic activity. Addition of formalin even at low levels completely inhibited the proliferation of any bacteria in the milk. AA

615

Taher (MM) and Lakshmaiah (N). **Folic acid stability in hydrogen peroxide-potassium thiocyanate-treated milk.** *Food Chemistry* 44(5); 1992: 343-347

616

Stewart (G), Gosselin (C) and Pandian (S). **Selected ion monitoring of tert-butyldimethylsilyl cholesterol ethers for determination of total cholesterol content in foods.** *Food Chemistry* 44(5); 1992: 377-380

A GC/MS method was applied to determine the total cholesterol in eggs and dairy products. Compared to the cholesterol estimated by colorimetric method, there was slight underestimation. The saponification and extraction procedure allowed for 98.6% recovery of spiked cholesterol in milk with a

coeff. of variation 2.1%. Even 5ng/100g food can be detected with 95% accuracy using external standards. SD

617

Shah (T), Nagabrahmam (D) and Shah (J). **A problem in milk pricing by Indian dairy co-operatives: Key issues and present policies.** *Indian Dairyman* 44(8); 1992: 384-392

The cost factor of milk covers 2 nutrients - milk fat and solids non-fat (SNF) but existing technology permits easy and rapid testing of fat alone. The implication of the 2-axis pricing formula (equivalent fat based or real) leads to under payment to buffalo milk and higher payment for cow milk and also the problem of dilution of milk supplied to the co-operatives. The problem of milk pricing being technological, two axis milk pricing formula has to wait till a feasible and easy SNF testing method is found. GS

618

Kalsi (BS). **Let's all do it - market more milk.** *Indian Dairyman* 44(8); 1992: 393-400

Indian milk marketing system viz. door delivery supply, sale to dealers/boothowners; returns to dealers; sales promotion programmes; optimisation of manpower resources; appointment of delivery agents; minimising record keeping and documentation; appointment of route supervisors for 20 booths; rationalisation of the milk distribution; fair pricing of milk with prices printed on the milk pouch; and recasting of the annual milk marketing plan are detailed. GS

### Sheep milk

619

Needa (EC). **Effects of long-term deep-freeze storage on the condition of the fat in raw sheep's milk.** *Journal of Dairy Research* 59(1); 1992: 49-55

Stability of fat in frozen and stored (-12, -20 and -27°C) raw sheep's milk from three herds showed a gradual increase in free fatty acids during 6 months storage; the rate of lipolysis being affected by storage temp. and differences between herds. After 6 months storage the residual lipase activity was 2% (-12°C), 11% (-20°C) and 24% (-27°C) of the initial activity in fresh milk. The potential for lipolysis in the stored samples, after they were removed from storage and allowed to thaw to 4°C, gradually fell as storage time was prolonged, which may be due to the loss of lipase activity. BV



## Milk products

620

Mulvihill (DM). **Trends in the production and utilisation of dairy protein products: Production.** *CSIRO Food Research Quarterly* 51(3/4); 1991: 145-157

Article describes the production of dairy protein products, production of caseins (destabilisation/precipitation), dewheying, washing, dewatering, drying, tempering and grinding, production of caseinates (sodium caseinate, other caseinates), miscellaneous methods of casein and co-precipitate isolation, industrial scale fractionation of caseins, production of whey protein-enriched products (whey powders/modified whey powders, whey protein concentrate production by ultrafiltration diafiltration, whey protein isolate production by ion exchange adsorption, lactalbumin production, fractionation of whey proteins) and co-precipitate production and milk protein concentrate production. 16 references. SRA

## Cheese

621

Tatsumi (K), Nishiya (T), Ido (K) and Kawanishi (G). **Effects of heat treatment on the meltability of processed cheese.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(2); 1991: 102-106 (Ja)

"Model cheese" simply consisted of sodium caseinate, butter fat, and water was prepared in order to study effects of heat treatment on the meltability of processed cheese. When the model cheese was held at 80°C after cooking, the meltability decreased with the increase of holding time. During this process, the increase of water insoluble protein was observed with the decrease of meltability. The correlation coeff. value of -0.92 indicated significant relationship between water insoluble protein content and meltability. The formation of the insoluble protein was considered being caused by aggregation of the protein adsorbed to the surface of fat globules in the cheese held at 80°C, and associated with the decrease of meltability. AA

622

Soda (ME) and Pandian (S). **Recent developments in accelerated cheese ripening.** *Journal of Dairy Science* 74(7); 1991: 2317-2335

This review article deals with conventional strategies for cheese ripening, principally employing different

enzymes that would be added to the cheese. Also reviewed are the more recent strategies that more often involve the addition of whole bacterial cells or their total components. Aspects considered are ripening at elevated temp., addition of enzymes from sources not cheese-related (proteinases and peptidases, lipases,  $\beta$ -galactosidases), enzymes from cheese-related microorganisms, enzyme cocktails, addition of slurry systems, other additives (amino acids and autolysed yeast), attenuated bacterial cells and genetically modified starter bacteria, acceleration by enzymes entrapped in liposomes or milk fat capsules (liposomes, microencapsulation in milk fat), and accelerated ripening of cheese made by conventional methods (ultrafiltered milk, low-fat cheese). 89 references. BV

## Gouda cheese

623

Spangler (PL), Jensen (LA), Amindson (CH), Olson (NF) and Hill (CGJr). **Ultrafiltered Gouda cheese: Effects of preacidification, diafiltration, rennet, and starter concentration and time to cut.** *Journal of Dairy Science* 74(9); 1991: 2809-2819

Preacidification of cheese milk to pH 6.3 resulted in some decrease in cheese pH. Low diafiltration level led to decreased cheese ripening measured as phosphotungstic acid- and TCA-soluble N. A decreased rennet concn. was found to be optimal because a level of two-thirds of conventional cheese led to excessive bitterness. Starter (3%), based on the wt. of the retentate, gave a cheese pH and moisture more similar to conventional cheese. Increasing time between coagulation and cut did not noticeably improve texture. BV

## Jack cheese

624

Eckner (KF) and Zottola (EA). **The behaviour of selected microorganisms during the manufacture of high moisture jack cheeses from ultrafiltered milk.** *Journal of Dairy Science* 74(9); 1991: 2820-2830

Number of contaminant microbes increased at a similar rate during manufacture in all cheeses. During the 6 month ripening period, bacterial starter culture population levels remained high, psychrotrophs declined slowly, *Staphylococcus* levels remained stable, and *Salmonella* populations decreased. No *Staphylococcus enterotoxin* was detected by reverse passive latex agglutination assay. BV



## Mozzarella cheese

625

Oberg (CJ), Merrill (RK), Brown (RJ) and Richardson (GH). **Effects of milk-clotting enzymes on physical properties of Mozzarella cheese.** *Journal of Dairy Science* 75(3); 1992; 669-675

Direct acid Mozzarella cheese was made in 6-L vats using calf chymosin, bovine pepsin, porcine pepsin, or *Mucor miehei* protease. Four cheeses were made with each enzyme. Stretch, melt, cook colour (reflectance colorimeter), moisture, and pH were measured at 1, 7, 14 and 28 days. Correlation coeff. among these parameters were calculated, and the effects of choice of enzyme and storage time at 4°C on these parameters were evaluated by analysis of variance. Cook colour was not affected by enzyme type and changed only slightly during storage. Melt was affected by choice of enzyme and increased significantly with time. During the 28-days ripening period, the melt of cheese made with calf chymosin increased the most. The smallest increase in melt was in cheese made with porcine pepsin. Stretch was significantly affected by enzyme and by storage time. Stretch decreased rapidly in all cheeses between day 1 and 7 and stabilized during the next 21 days. Cheese made with porcine pepsin had the greatest stretch, and cheese made with calf chymosin had the least stretch, between day 7 and 28. Melt increased, and stretch decreased, during storage of all cheeses. The type of milk-clotting enzyme used played a significant role in determining physical properties of direct acid Mozzarella cheese. AA

## Ras cheese

626

El-Soda (MA), Hantira (AA), Ezzat (NI) and El-Shafei (HK). **Accelerated ripening of Ras cheese using freeze-shocked mutant strains of *Lactobacillus casei*.** *Food Chemistry* 44(3); 1992; 179-184

Ras cheese was manufactured with Lac<sup>-</sup> and Lac<sup>+</sup> mutant strains of *L. casei*. Cheese analysis and the organoleptic evaluation of the cheese were carried out for 6 wks. Experimental cheeses showed higher values for soluble nitrogen, total volatile acidity and free fatty acids during cheese ripening than the controls. The organoleptic evaluation indicates that, as a general rule, the Lac<sup>-</sup> mutants obtained higher scores than the controls. Results of this work show that incorporation of frozen (Lac<sup>-</sup>) strains of *L. casei* into Ras cheese as a source of enzymes could be useful for accelerating maturation, and could also serve to minimize the development of bitterness. AA

## Ghee

627

Galhotra (KK) and Wadhwa (BK). **Flavour potential of ghee-residue. Part 1. Free fatty acids and total carbonyls level.** *Indian Journal of Dairy Science* 44(9); 1991; 565-567

Ghee-residue lipids were extracted by suitably modified Mojonnier method and a newly developed single solvent (methanol) method. Methanol extraction method was more effective in extracting ghee-residue lipids along with FFA and carbonyls as flavour compounds than the Mojonnier method. The levels of FFA and total carbonyls were higher in ghee-residue than in ghee indicating that ghee-residue is a rich source of flavour compounds, namely FFA and carbonyls. AA

628

Galhotra (KK) and Wadhwa (BK). **Flavour potential of ghee-residue. Part II: Lactones level.** *Indian Journal of Dairy Science* 44(9); 1991; 568-572

The gas chromatograms of lactonic isolates of ghee-residue showed a complex profile of 47 peaks. The homologous series of n-saturated  $\delta$  and  $\gamma$ -lactones from C<sub>6</sub> - C<sub>16</sub> and C<sub>18</sub> have been characterised in ghee-residue.  $\delta$ -lactones compared to  $\gamma$ -lactones were the major components in ghee-residue.  $\delta$ -C<sub>12</sub>, C<sub>14</sub> and C<sub>18</sub> were the major lactones in ghee-residue. The study revealed that ghee-residue is a rich source of lactones. AA

## Khoa

629

Patel (RS), Gupta (VK), Singh (S) and Reuter (H). **Effect of addition of whey protein concentrate on the sensory and Instron texture profile of khoa made from cow milk.** *Journal of Food Science and Technology (India)* 30(1); 1993; 64-65

Whey protein conc. (5% solids) incorporated khoa showed improved sensory characteristics over the control cow milk khoa and compared well with the commercial one. Lower total solids content in whey protein conc. incorporated khoa was necessary to counter adverse effect of whey protein conc. on the Instron texture parameters. AA

## Paneer

630

Pawan Kumar and Bector (BS). **Enhancement of shelf-life of paneer with food additives.** *Indian Journal of Dairy Science* 44(9); 1991; 577-584



The shelf-life of *paneer* prepared with and without addition of TBHQ was studied. *Paneer* stored at 5, 15 and 25°C were analysed for microbiological and chemical changes. The growth rate of microorganisms increased at higher storage temp. Increased storage time and temp. resulted increased titratable acidity, free fatty acid content and soluble N. Addition of 0.05% TBHQ and BHA, individually or in combination to *paneer* samples reduced the initial counts of microorganisms, and checked their growth during storage. Sensory scores of the treated *paneer* showed higher rate than the control samples. SRA

## Yoghurts

631

Vedamuthu (ER). **The yoghurt story - past, present and future. Part X. Dairy, Food and Environmental Sanitation** 12(6); 1992; 351-354

In this series new directions, alternate uses for yoghurt, and research needs are presented. SRA

632

Tanaka (T) and Hatanaka (K). **Application of hydrostatic pressure to yoghurt to prevent its after acidification.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 39(2); 1992; 173-177 (Ja)

Since high acidity in yoghurt which occurs during its storage and delivery is unpopular among consumers, the application of hydrostatic pressure to yoghurt to prevent its after acidification (rise of acidity after packaging) was studied. Yoghurt was filled in flexible pouches and heat sealed. After applying hydrostatic pressure to the pouched yoghurt with a cold isostatic equipment MCT-150 S (Mitsubishi Heavy Industry Co.) under various pressures and temp., it was stored for 2 wks at 10°C. The acidity, the number of vital lactic acid bacteria and the texture of the yoghurt were evaluated periodically during the storage. The pressure treatment at below 200 MPa for 10 min at room temp. did not prevent the after-acidification, and the initial number of vital lactic acid bacteria was maintained for 2 wk storage. The pressure treatment at 200 - 300 MPa for 10 min at the same temp. prevented the after-acidification and maintained the initial number of vital lactic acid bacteria. By the treatment at over 300 MPa for 10 min at the same temp. after-acidification was prevented and the number of vital lactic acid bacteria was decreased as the applied pressure was increased. The texture of yoghurt was maintained regardless of the applied pressure when treatment temp. was below 20°C. Therefore, it was recognized that application of hydrostatic pressure at 200 - 300

MPa to yoghurt was effective to maintain its quality during storage and delivery. AA.

## Milk proteins

633

Kneifel (W), Paquin (P), Abert (T) and Richard (J-P). **Water-holding capacity of proteins with special regard to milk proteins and methodological aspects. A review.** *Journal of Dairy Science* 74(7); 1991; 2027-2041

Review. 145 references. BV

634

Kitts (DD) and Yuan (YV). **Caseinophosphopeptides and calcium bioavailability.** *Trends in Food Science and Technology* 3(2); 1992; 31-35

Reviews the physiological significance of caseinophosphopeptides (CPP) in promoting value added products from milk protein and the role of CPP in enhancing intestinal Ca solubility which lead to bioavailability of Ca from milk. 41 references. GS

635

Kansal (VK). **Essentialities of milk proteins in human nutrition.** *Indian Dairyman* 44(7); 1992; 328-331

Quality of proteins from cow and human milk, nutritional quality of milk proteins and their supplementary value, dietetic value of milk proteins; milk protein allergy, immunological aspects of milk proteins; nature and types of milk enzymes are the aspects covered, review. 15 references. GS

## MEAT AND POULTRY

### Meat

636

Smith (JL). **Toxoplasma gondii in meats - a matter of concern ?.** *Dairy, Food and Environmental Sanitation* 12(6); 1992; 341-345

Article describes, the life cycle of *Toxoplasma gondii*, survival of *T. gondii* oocysts, distribution of *T. gondii*, nature, occurrence of *T. gondii* in foods, destruction of *T. gondii* in foods, human toxoplasmosis and economics of toxoplasmosis. SRA



637

Pipek (P), Sinevic (V) and Sojkova (S). **Relationship between rheological properties of coarsely minced meat and its water-holding capacity.** *Die Nahrung* 35(7); 1991; 701-704 (De)

Rheological properties of coarsely disintegrated presalted meat were studied using rotational viscometry. The close relationship between rheological properties and water-holding capacity (WHC) has been found for minced meat samples at different water additions. Time dependences of the rheological properties (yield values) have similar features as in the case of WHC. AA

638

Okonkwo (TM), Obanu (ZA) and Ledward (DA). **The stability of some intermediate moisture smoked meats during storage at 30°C and 38°C.** *Meat Science* 31(3); 1992; 248-255

## Beef

639

Gill (CO), Harrison (JCL) and Phillips (DM). **Use of a temperature function integration technique to assess the hygienic adequacy of beef carcass cooling process.** *Food Microbiology* 8(2); 1991; 83-94

640

Dickson (JS). **Attachment of *Salmonella typhimurium* and *Listeria monocytogenes* to beef tissue: Effects of inoculum level, growth temperature and bacterial culture age.** *Food Microbiology* 8(2); 1991; 143-151

641

Griffin (CL), Shackelford (SD), Stiffler (DM), Smith (GC) and Savell (JW). **Storage and display characteristics of electrically stimulated, hot-boned and nonstimulated, cold-boned beef.** *Meat Science* 31(3); 1992; 279-286

## Mutton

## Lamb

642

Brennand (CP) and Lindsay (RC). **Distribution of volatile branched-chain fatty acids in various lamb tissues.** *Meat Science* 31(4); 1992; 411-421

Volatile fatty acids (C4 - C11) including even-, odd-, and branched-chain members in lamb tissues were quantitatively analyzed. Volatile branched-chain fatty acids (BCFA) were more conc. in subcutaneous

adipose tissue samples (rump, shoulder, breast) than in perinephric adipose or muscle tissues. Perinephric adipose tissue contained relatively high quantities of n-chain, even-numbered fatty acids and very low levels of BCFA. Greater variation existed in fatty acid profiles among similar subcutaneous adipose tissues from different lambs than between samples of adipose tissue from different carcass sites from a given lamb sample. 4-Methyl- and 4-ethyloctanoic acids were present at concn. greatly above threshold levels in all lamb fats tested, and thus upon hydrolysis would contribute sp.-related flavours to lamb. 4-Methylnonanoic concn. in lamb fats ranged from nondetectable to > the threshold level, and therefore this compound would not always contribute to the sp.-related flavours of lamb. Lean meat samples contained very low concn. of 4-methyl- and 4-ethyloctanoic acids. AA

## Pork

643

Brown (T) and James (SJ). **Process design data for pork chilling.** *International Journal of Refrigeration* 15(5); 1992; 281-289

Design data collected in a survey of UK abbatoirs on conventional pork-chilling systems-ultra-rapid chilling with air at -30°C; immersion chilling in brine at 0°C; ice-bank chilling in humid air at 2°C and spray chilling in 2 stages, at 10°C for 2 h followed by 4°C for 21 h are presented highlighting the problems and inadequacies. SD

644

Borisova (MA) and Oreshkin (EF). **On the water condition in pork meat.** *Meat Science* 31(3); 1992; 257-265

645

Taylor (AA) and Tantikov (MZ). **Effect of different electrical stimulation and chilling treatments on pork quality.** *Meat Science* 31(4); 1992; 381-395

## Products

## Ham

646

Kormendy (L), Zsarnoczay (G) and Mihalyi (V). **A new, modified acid phosphatase assay for determining the extent of heat treatment in canned hams.** *Food Chemistry* 44(5); 1992; 367-375



647

Toldra (F), Miralles (MC) and Flores (J). **Protein extractability in dry-cured ham.** *Food Chemistry* 44(5); 1992; 391-394

## Poultry

648

Swain (MJ), James (SJ) and Khodabandehloo (K). **The potential for robotics in poultry processing.** *Indian Food Industry* 11(3); 1992; 24-32

A feasibility study was carried out to identify the potential areas of application of robotics in poultry processing. Hanging of live birds, evisceration, grading, trussing, portioning, giblet packaging and further processing were the 7 areas identified for the application of robotic technology. The other areas of application of robotics which will require developments in computer and robotic technology before they are economically viable are the pick and place process, the robotic cell used in drumstick investigations, the vision system which enables to recognise and distinguish chicken drumsticks, mechanical transfer of drumsticks and gripper design which will operate a high speed, preferably with any non-uniform, non-rigid article while fulfilling stringent health and safety requirements. CSA

## Chickens

649

Sachdev (AK), Ram Gopal and Verma (SS). **Storage stability of chicken gizzard pickle.** *Indian Journal of Poultry Science* 27(4); 1992; 217-223

Data were collected from 8 trials on the quality changes of oil-based chicken gizzard pickle kept at ambient temp. for a period of 45 and 75 days in summer/rainy and winter seasons, respectively as well as under refrigerated (4 plus or minus 1°C; 80% RH) condition. In summer/rainy season (27.3°C - 34.1°C; RH 63.0 - 68.3%), the pH, shear force value (SFV) and ether extract (EE) were not significantly affected by the storage conditions and periods. However, significant decrease in moisture with increase in crude protein (CP) and TBA values was evident with the enhanced storage periods. The sensory traits were not significantly influenced by the storage conditions and periods. In winter season (16.6°C - 25.6°C; RH 16.1 - 71.2%), significant changes were observed in pH (under refrigeration only), moisture and CP. However, the SFV, EE and TBA values did not differ significantly upto 75 days of storage. Organoleptic evaluation at 75 days of storage revealed significant decline in the acceptability of product kept at ambient temp. The

total plate counts showed a general increase with the storage periods. AA

## Turkeys

650

Nychas (GJE) and Board (RG). **Enterotoxin B production and physicochemical changes in extracts from different turkey muscles during the growth of *Staphylococcus aureus* S-6.** *Food Microbiology* 8(2); 1991; 105-117

Enterotoxin B production during the growth of *Staph. aureus* S-6 in extracts from thigh or breast differed significantly from that of the lower leg of turkey although the extent of growth was similar in all cases. The addition of glucose or an increase in oxygen tension also affected toxin production. BV

## Products

### Eggs

651

Satyanarayana Reddy (L) and Sreenivas Reddy (M). **Effect of oil coating and storage condition on the quality of duck and chicken eggs.** *Indian Journal of Poultry Science* 27(4); 1992; 208-213

Duck eggs showed significantly shorter air cell height, higher albumen index, Haugh unit score and % yolk but lower % albumen as compared to chicken eggs. Oil coated refrigerated eggs maintained significantly better quality in terms of air cell height, wt. loss, albumen and yolk indices, Haugh unit scores and pH of albumen and yolk than oil-coated eggs held at ambient temp. or uncoated refrigerated eggs. As the storage period increased from 0 to 42 days, there was a significant increase in air cell height, % yolk, pH of albumen and yolk and decrease in albumen and yolk indices, Haugh unit scores, % thick albumen and inner thin albumen. GS

652

Panda (PC) and Sharma (DP). **Maintenance of quality of duck eggs during transportation.** *Indian Journal of Poultry Science* 27(4); 1992; 214-216

Transport trials were carried out to assess the effect of journey hazards on the internal physical quality of duck eggs using different types of filler flats, loaded in corrugated fiber board boxes. Breakage of eggs and decline in their internal quality in terms of albumen index, yolk index and Haugh unit were less when transported, using paper pulp molded filler flats in comparison to plastic filler flats. The said decline could be significantly ( $P < 0.01$ ) minimized



further by spraying the eggs with CFTRI coating oil prior to transportation. AA

## Egg powder

653

Satyanarayana (TS), Gopala Rao (KR) and Sankaran (R). **Microbial quality of whole egg powder.** *Journal of Food Science and Technology (India)* 30(1); 1993; 50-51

The applications of good manufacturing practices in the preparation of freeze-dried and foam-mat-dried whole egg powders and packing in 3 package systems resulted in obtaining a microbiologically safe and good quality product which could be stored for considerably longer periods of time. AA

## SEAFOODS

### Prawns

654

Rao (DG). **Studies on viscosity-molecular weight relationship of chitosan solutions.** *Journal of Food Science and Technology (India)* 30(1); 1993; 66-67

The viscosity of chitosan solution in 1% acetic acid various concn. (0.25 - 1.0% by wt. of chitosan) was measured by Light scattering method. The data were fitted to Mark-Houwink equation as  $\eta_i = 4.74 \times 10^{-2} (M_w)^{0.723}$  which helps evaluate the av. mol. wt. (wt. av.) of chitosan samples with a knowledge of their intrinsic viscosity. AA

655

Pradip Chakraborty. **Present status of prawn processing in India.** *Indian Food Industry* 11(3); 1992; 39-41

Brief mention is made of the export of marine products, types of frozen prawns (head-on-headless-shell on, butterfly fantail, peeled and deveined, peeled and un-deveined cooked peeled, peeled deveined and cooked), processing of prawns, cryogenic freezing and spiral freezers which consists of spiral tower, insulated tower and belt wash station. CSA

### Fish

656

Singh (BR) and Kulshrestha (SB). **Prevalence of *Shigella dysenteriae* group A type in fresh water**

**fishes and seafoods.** *Journal of Food Science and Technology (India)* 30(1); 1993; 52-53

Antibiotic sensitivity pattern of 7 *Shigella dysenteriae* group A strains, isolated from 185 fresh water fish and seafood samples, showed that chloramphenicol, norflox, ampicillin, gentamicin, streptomycin, doxycillin, furazolidin and ledermycin were effective in controlling *in vitro* growth. All the strains were resistant to septran, but only 3 to nalidixic acid. AA

### Sardines

657

Ababouch (L), Afilal (ME), Rhafiri (S) and Busta (FF). **Identification of histamine - producing bacteria isolated from sardine (*Sardina pilchardus*) stored in ice and at ambient temperature (25°C).** *Food Microbiology* 8(2); 1991; 127-136

55 bacterial isolates out of 568 were capable of producing detectable amounts of histamine on sardine fish infusion broth (SFIB) supplemented with histidine. 51 of the 55 isolates belong to *Enterobacteriaceae*, (35 were *Proteus* sp.) profile histamine - producing bacteria (HPB) were *Morganella morganii*, (7 isolates) *Proteus vulgaris* (2 isolates), *P. mirabilis* (1 isolate), *Providencia stuartii* (2 isolates), unidentified species of *Proteus* (2 isolates) and 4 unidentified isolates. Histamine production by 3 species of *Proteus* showed that these strains were more active at pH 5 than at pH 7, and at 25°C than at 4 or 35°C as they produced over 16  $\mu\text{mol}$  histamine  $\text{ml}^{-1}$  SFIB in 24 h. Addition of 8% NaCl to SFIB and refrigeration at 4°C effectively reduced histidine decarboxylase activity of these strains. SRA

## PROTEIN FOODS

### Infant foods

658

Chandrasekhar (U), Vasanthamani (G) and Thomas (AK). **Infant feeding and weaning practices among Irulas of Attapadi hills and Lambas of Katchuvadi hills.** *Indian Journal of Nutrition and Dietetics* 27(6); 1990; 175-180

Survey covers two tribal communities - Lambas of Katchuvadi hills (Tamilnadu State, India) and Irulas of Attapadi hills (Kerala State, India). Survey covered aspects like the background information (income, family size and others), dietary practices, infant feeding and weaning practices; nutritive value of local weaning food, and nutritional profile of mothers and infants. Results of the survey



indicated that tribals had only limited number of foods and methods of preparation. Not much difference was found in weaning practices between the two tribes. Both the tribals prepared infant foods from special type of greens available in their locality, but the method of preparation was same. Lamba's were nutritionally better than Irulas. KAR

## ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

### Alcoholic beverages

#### Beer

659

Dale (CJ) and Young (TW). **Applications of fast protein liquid chromatography (FPLC) to the analysis of the nitrogenous constituents of beer.** *Journal of the Institute of Brewing* 98(2); 1992: 117-121

The nitrogenous constituents of beer were investigated by several FPLC techniques. Size exclusion chromatography of dialysed beer material using columns of Superose 6 and Superose 12 suggested that beer polypeptide material was distributed across a wide relative molecular mass (Mr) range with discrete fractions of high Mr (Mr 300 000, Mr 500 000), Mr c60000, Mr c40 000 and relatively low Mr (Mr 5 000 - 20 000). The composition of fractions Mr > 40 000 and Mr 40 000 - 60 000 was investigated by ion exchange chromatography. Differences were detected in the elution profiles of fractions prepared from beers brewed from grists comprising 100% malt, 80% malt plus 20% torried wheat and 100% malted wheat consistent with differences in the polypeptide composition of these fractions. The Superose 12 column, although designed for the fractionation of high mol. wt. components, also provided a method of fractionating low mol. wt. nitrogenous materials directly from beer (for example fractions containing purine nucleosides). Reverse phase chromatography was employed in the analysis of beer peptides and demonstrated the complex composition of beer peptide fractions. AA

660

Dale (CJ) and Young (TW). **Low molecular weight nitrogenous compounds and their influence on the stability of beer foam.** *Journal of the Institute of Brewing* 98(2); 1992: 123-127

Addition of low mol. wt. nitrogenous components, nucleoside (adenosine), nucleotide (AMP) amino acids (glutamic acid, glycine, proline and asparagine) and tripeptide (glycylglycylglycine) had

no effect on the head retention value of beer. Under such conditions of artificial manipulation of the content of low mol. wt. beer nitrogenous components no correlation between the nitrogen mol. wt. ratio of beer and beer head retention value was observed. Collapsed beer foam was collected and separated into soluble and precipitated fractions. Analysis of collapsed beer foam demonstrated that high mol. wt. polypeptide material and isomerised  $\alpha$  acids are conc. in beer foam and are constituents of beer foam precipitate material. Beer foam precipitate material may be stabilised by ionic interactions between polypeptide material and isomerised  $\alpha$  acids. Further analysis of beer and collapsed beer foam demonstrated that purine nucleosides are not conc. in beer foam. Similarly, under condition simulating beer dispense, amino acids are not conc. in beer foam. Under strongly selective foaming conditions, such as those encountered in a foam tower, the hydrophobic amino acids, valine, isoleucine, leucine and phenylalanine are conc. in beer foam. AA

661

Kruger (L), Pickerell (ATW) and Axcell (B). **The sensitivity of different brewing yeast strains to carbon dioxide inhibition: Fermentation and production of flavour-active volatile compounds.** *Journal of the Institute of Brewing* 98(2); 1992: 133-138

The sensitivity of brewing yeast strains, with different oxygen demands, to carbon dioxide inhibition was investigated. Lab. fermentations were performed with, and without, protein-based "yeast foods" to lower dissolved CO<sub>2</sub> during fermentation. Differences were observed in yeast fermentative performance in the presence and absence of "yeast foods" for all yeast strains tested. Fermentation performance was improved with addition of "yeast foods". There was improved carbohydrate utilisation and amino acid uptake, while acetaldehyde levels at the end of fermentation were decreased. There was an increase in fusel oil production and acetate ester levels at the end of fermentation. Sulphur dioxide levels at the end of fermentation were unaffected by "yeast food" addition. Different yeast strains displayed differing sensitivity to CO<sub>2</sub> inhibition for all parameters tested. Sensitivity to CO<sub>2</sub> was not found to be related to oxygen demand of the yeast strains. AA

#### Wines

662

Lopez (A) and Secanell (P). **A simple mathematical empirical model for estimating the rate of heat generation during formation in white-wine making.** *International Journal of Refrigeration* 15(5); 1992: 276-280



The model obtained has been verified in fermentation at different temp. of Macabeo and Chardonnay musts with different states of maturity. By using a pilot fermentation plant, the musts were fermented to an industrial level at controlled temp. in 75 l stainless-steel vessels. SD

## Non-alcoholic beverages

### Coffee whitener

663

Gruetzmacher (TJ) and Bradley (RLJr). **Acid whey as a replacement for sodium caseinate in spray-dried coffee whiteners.** *Journal of Dairy Science* 74(9); 1991; 2838-2849

Demineralized acid whey protein is an acceptable replacement for sodium caseinate in spray-dried coffee whiteners and can replace sodium caseinate at a 1:2 ratio. BV

### Fruit juices

#### Apple juices

664

Bayindirli (L). **Mathematical analysis of variation of density and viscosity of apple juice with temperature and concentration.** *Journal of Food Processing Preservation* 16(1); 1992; 23-28

The multiparameter model derived using density, viscosity of apple juice at different sugar concn. and temp. satisfactorily represented their variations in the ranges 14 - 39°Brix, 20 - 80°C respectively. SD

#### Blackcurrant juices

665

Ibarz (A), Pagan (J) and Miguelsanz (R). **Rheology of clarified fruit juices. II: Blackcurrant juices.** *Journal of Food Engineering* 15(1); 1992; 63-73

The rheological behaviour of depectinized blackcurrant juice was measured at a wide range of temp. (5 - 60°C) and concn. (35 - 64.5°Brix), using a concentric viscometer. The results indicated that depectinized clarified blackcurrant juice behaves as a Newtonian fluid. The effect of the temp. can be described by an Arrhenius-type equation. The activation energy for viscous flow was in the range 4.55 - 10.57 kcal/g mol. depending on the concn. The effect of concn. can be described by 2 types of equation, power-law and exponential. Finally, an equation for the dependence of dynamic viscosity on

temp. and  $a_w$  was developed:  $\eta = 2.13 \times 10^{-5} (a_w)^{-17.6} \exp(3380/T)$ . AA

### Peach juices

666

Ibarz (A), Gonzalez (C), Esplugas (S) and Vicente (M). **Rheology of clarified fruit juices. I: Peach juices.** *Journal of Food Engineering* 15(1); 1992; 49-61

In this work, the rheological behaviour of clarified and depectinated peach juice is studied. Peach juices free of pectin and pulp behave as Newtonian fluids. The effect of temp. and concn. on the viscosity of these juices is examined. The temp. effect was studied at 10 different temp. between 5 and 60°C. Finally, an equation describing the combined effect of temp. and concn. on the viscosity is given. AA

### Tea

667

Suematsu (S), Hisanobu (Y), Saigo (H), Matsuda (R), Hara (K), Komatsu (Y). **Studies on preservation of constituents in canned drinks. Part I. Effects of pH on stability of constituents in canned tea drinks.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 39(2); 1992; 178-182 (Ja)

In order to establish suitable production conditions of canned tea drinks, first of all, caffeine, catechins and L-ascorbic acid in commercial canned tea drinks were quantitatively determined as indicative substances of quality change by HPLC and colorimetric analysis. Secondly, canned green tea drink was prepared as a trial to examine the influence of pH of extraction media and of heat processing on the stability of caffeine, catechins and L-ascorbic acid. From the analysis of various kinds of commercial canned tea drinks including oolong tea, black tea and green tea, it was found that the concn. of caffeine and catechins in commercial canned tea drinks were 1/2 - 2/3 of those in normal tea infusion. The drinks kept at lower pH had higher retention of catechins. From the test production of canned green tea, it was found that, (1) catechins were less stable than caffeine in heat processing, (2) L-ascorbic acid was considerably stable in heat processing, (3) most catechins decreased by heat processing but (+)-catechin was remarkably increased, (4) the increase of (+)-catechin was possibly caused by isomerization of (-)-epicatechin, (5) the isomerization of (-)-epicatechin was remarkably depressed in slightly acidic extraction media containing citric acid. In conclusion, the most dominant factor affecting the stability of



catechins in tea drinks was pH of extraction media. AA

668

Kubo (I), Muroi (H) and Himejima (M). **Antimicrobial activity of green tea flavour components and their combination effects.** *Journal of Agricultural and Food Chemistry* 40(2); 1992; 245-248

The antimicrobial activity of the 10 most abundant volatile components of green tea flavour (1 - 10) was examined. The activity of each volatile was moderate but broad in spectrum. Most of the volatiles tested inhibited the growth of one of the most important cariogenic bacteria, *Streptococcus mutans*. Among them, nerolidol (4) was the most potent; linolool (1) was the least effective. In addition, indole (7) significantly enhanced the activity of  $\delta$ -cadinene (2) and caryophyllene (10) against *Str. mutans*. These two sesquiterpene hydrocarbons also showed potent activity against a dermatomycotic bacterium, *Propionibacterium acnes*. Lastly, but most importantly, indole inhibited the growth of all of the Gram-negative bacteria tested, *Pseudomonas aeruginosa*, *Enterobacter aerogenes*, and *Escherichia coli*. AA

## FATS AND OILS

669

Duthie (IF) and Barlow (SM). **Dietary lipids exemplified by fish oils and their n-3 fatty acids.** *Food Science and Technology Today* 6(1); 1992; 20-36

Presents a general view of dietary lipid in terms of early history and trends since the 1900's and current patterns of lipid usage and content, safety of dietary lipid under the following headings: association with cardiovascular disease, the recent interest in n-3 fatty acids and health, potentially unsafe components of edible oils and their assessment. BV

670

Engst (W), Petrizika (M) and Macholz (R). **Analysis of fatty acid composition of biomass lipids.** *Die Nahrung* 35(7); 1991; 695-700 (De)

The fatty acid composition of lipids produced by different bacteria, yeasts and algae are determined by capillary GC-MS. The microbial lipids are characterized by very complex fatty acid fractions including hydroxylated, cyclic or odd numbered acids (up to 50% in "Alkane-yeasts") whereas the analyzed algae and plant fatty acids are different from the typical food lipids only in their quantitative

ratio. Up to 30% arachidonic and 60% linoleic acid were detected in *Porphyridium cruentum* and *Wolffia arrhiza*, respectively. AA

## Oils

671

Miyagawa (K), Hirai (K) and Takezoe (R). **Tocopherol and fluorescence levels in deep-frying oil and their measurement for oil assessment.** *Journal of the American Oil Chemist's Society* 68(3); 1991; 163-166

This study examined how tocopherol retention is affected by the presence or absence of food coatings, and also tested the measurement of fluorescent substance levels in cooking oil to evaluate oil deterioration. Potato slices were tempura-fried (with a coating) or french-fried (without a coating). The 3 tocopherol isomers decreased with heating time, and better retention was found in the tempura process. The decomposition rates of tocopherol were in the order  $\gamma$ - >  $\delta$  greater than or equal to  $\alpha$  for the 3 isomers for both processes over repeated fryings. The fluorescence of frying oil increased 15- and 17-fold after tempura- and french-frying, respectively, for 32 consecutive times. Changes in the amounts of tocopherol and the fluorescence correlated well with the changes found by the chemiluminescent intensity and 5 conventional methods of oil quality measurement. These results indicated that tocopherol retention is affected by the food coating, and that measurements of vitamin E loss and fluorescence increase in oil should be useful for assessing the progressive deterioration of frying oil with its repeated usage. AA

672

Elliott (JM) and Parkin (KL). **Lipase-mediated acyl-exchange reactions with butter oil in anhydrous media.** *Journal of the American Oil Chemist's Society* 68(3); 1991; 171-175

Conditions optimum for porcine pancreatic lipase catalyzed acyl-exchange reactions between a free fatty acid (FFA), undecanoic acid, and butter oil in anhydrous media were established. No solvent was required for reaction, indicating that butter oil could act as dispersant as well as substrate in reactive mixtures. Optimum temp. and pH for the reaction were 70°C and 6.5 to 7.0 respectively. The addition of up to 550 mM water to reactive mixtures had little influence on the initial rates of acyl-exchange, but shifted the reaction equilibrium to favour net hydrolysis. Optimal FFA concn. for acyl-exchange was 250 mM in terms of initial rates, and substrate inhibition by FFA was apparent at levels up to 1000 mM. In terms of % reaction yield and absolute reaction yield after 18 h, 50 mM and 250 mM FFA.



respectively, were optimum. Initial reaction rates for acyl-exchange between two model triacylglycerides indicated that esterified fatty acids were better substrates than FFA under the conditions evaluated. AA

673

Tariq Saeed (M), Agarwal (R), Khan (MWY), Ahmad (F), Osman (SM), Akihisa (T), Suzuki (K), Matsumoto (T). **Unsaponifiable lipid constituents of ten Indian seed oils.** *Journal of the American Oil Chemist's Society* 68(3); 1991; 193-197

The unsaponifiable lipid constituents, hydrocarbons, triterpene alcohols and sterols of 10 seed oils (*Catharanthus roseus*, *Nymphaea nelumbo*, *Casuarina equisetifolia*, *Lagerstroemia therolli*, *Prosopis juliflora*, *Mimusops elengi*, *M. hexandra*, *Pongamia pinnata*, *Acrocarpus fraxinifolius*, and *Bauhinia retusa*) were investigated by GLC. Total unsaponifiables ran from 4 - 14%. Some of the seed oils contained large quantities of  $\beta$ -amyrin,  $\alpha$ -amyrin and cycloartenol. *Acrocarpus fraxinifolius* was found to contain 84% of lupeol. Stigmasterol (24-ethyl-22 $\epsilon$ -dehydrocholesterol),  $\beta$ -sitosterol (24-ethyl-cholesterol) and campesterol (24-methyl-cholesterol) were common constituents in all the seed oils. Besides these constituents, tirucallol, taraxerol,  $\Psi$ -taraxasterol, fucosterol, isofucosterol, avenasterol and cholesterol also were detected in small quantities. AA

674

Boki (K), Kubo (M), Kawasaki (N) and Mori (H). **Adsorption isotherms of pigments from alkali-refined vegetable oils with clay minerals.** *Journal of the American Oil Chemist's Society* 69(4); 1992; 372-378

This study reports the applicability of the Langmuir and Freundlich equations for adsorption of pigments from these alkali-refined vegetable oils (rapeseed, soybean, wheatgerm, safflower, corn, cottonseed and sunflower) with montmorillonite, sepiolite and standard activated clay. In addition, the isosteric heat of adsorption of pigments on sepiolite and standard activated clay was calculated from a Clausius-Clapeyron equation to the adsorption isotherms from rapeseed and soybean oils at 70, 90 and 110°C. BV

#### Palm oils

675

Goh (EM) and Ker (TH). **Relationship between slip melting point and pulsed NMR data of palm kernel oil.** *Journal of the American Oil Chemist's Society* 68(3); 1991; 144-146

A quantitative relationship between slip melting point (SMP) of palm kernel oil and pulsed nuclear magnetic resonance (NMR) data was established. Regression analysis on the SMP and solid fat content (SFC) data by NMR afforded the following relationship:  $SMP(^{\circ}C) = 0.03278 \times (SFC\ 10) + 0.1458 \times (SFC\ 20) + 19.1738$  where SFC 10 was the solid fat content (%) at 10°C and SFC 20 was the solid fat content (%) at 20°C. The coeff. of multiple correlation was 0.87871. The equation was tested with 12 samples of crude and refined palm kernel oil. SMPs as determined indirectly by NMR correlated well with the conventional open capillary tube results ( $r = 0.99998$ ). The max. difference observed was 0.3 C. The correlation can be applied usefully for quality control. AA

#### Rapeseed oils

676

Benjelloun (B), Talou (T), Delmas (M) and Gaset (A). **Oxidation of rapeseed oil: Effect of metal traces.** *Journal of the American Oil Chemist's Society* 68(3); 1991; 210-211

The presence of Fe (6.2%) and Cu (93.8%) in rapeseed oil could have a effect on oil oxidation. Metal traces increase formation rate of peroxides and catalyse reactions between unsaturated fatty acids and oxygen. BV

#### Soybean oils

677

Simpson (TD). **Phospholipase D activity in hexane.** *Journal of the American Oil Chemist's Society* 68(3); 1991; 176-178

Phospholipase D converts phosphatidylcholine (PC) to phosphatidic acid (PA) at 65°C in water-saturated hexane. Presumably, the active site of the enzyme remains hydrated in the interior of a lipid micelle. Enzyme activity at elevated temp. in a nonaqueous medium contrasts sharply with inactivation at high temp. in aqueous solution. Results demonstrate that nonhydratable phospholipids can be produced enzymatically under conditions comparable to those during oil extraction in commercial soybean processing. AA

678

Habile (M), Barlow (PJ) and Hole (M). **Adsorptive bleaching of soybean oil with non-montmorillonite Zambian clays.** *Journal of the American Oil Chemist's Society* 69(4); 1992; 379-383



As an alternative to montmorillonite clay (MC), 3 local Zambian clays have been used to bleach soybean oil. The bleaching action of the natural clays was poor when compared with commercial acid-activated MC and activated charcoal (AC) adsorbents. However, acid-activation of the Zambian clays profoundly increased their adsorptive activity. Reduction of 88% in soybean oil colour (Lovibond Red) by each of the 3 Zambian clay samples represented an efficiency close to that of MC (94%) and better than AC (63%). Peroxide value (PV) of the oil was reduced by 85% (MC) and 78% (AC) while 68% was the highest reduction for the activated Zambian clays. After 12 wk of storage at ambient temp., the bleached soybean oil samples showed some oxidation. Consideration of the totox values indicated that the Zambian clay-bleached oil was more stable over this length of storage when compared with the MC bleached oil. The bleaching action shown by Al-exchanged clays was closely related to their acid-activated counterparts. These results demonstrate a dependency of adsorptive bleaching with Zambian clays on proton availability. Comparative powder X-ray diffraction analysis of the clays showed that quartz was the major mineral present, followed by kaolinite. No MC was detected. It was concluded that by appropriate treatment to generate Bronsted acidity (protons), Zambian clays can be converted into potent adsorbents for soybean oil impurities. AA

679

Rusnac (LM), Floarea (O) and Vladea (RV). **Continuous hydrogenation of vegetable oils in reactors equipped with static mixers.** *Journal of the American Oil Chemist's Society* 69(4); 1992: 384-386

Continuous hydrogenation of industrially refined soybean oil with Harshaw Ni catalyst was achieved in the slurry column equipped with Sulzer SMV motionless mixers. The influence of the operating parameters (temp., pressure, catalyst concn. and gas velocity) was investigated. BV

## SPICES AND CONDIMENTS

### Papads

680

Bhagirathi (L), Urooj (A) and Puttaraj (S). **Utilization of cowpea in the preparation of papad.** *Journal of Food Quality* 15(5); 1992: 349-355

Dough making, rolling properties and physical appearance of cowpea papad were similar to blackgram papad. Proximate composition of cowpea and blackgram papads was also similar.

Trained and untrained panels rated the quality of the cowpea papad higher. Varietal differences of cowpea did not affect the quality characteristics of the papad. Cowpea flour with all the desirable functional properties for making papads forms an excellent raw material for the papad industry. SD

## SENSORY EVALUATION

681

Rao (MA). **Role of rheology in flow of fluid and semi-solid foods.** *Indian Food Industry* 10(6); 1991: 47-53

Non-Newtonian fluid foods and the specific rheological models that have been employed in studies related to flow of fluid foods is considered in this article. Aspects covered are the flow behaviour of foods and rheological models (flow models, effect of temp. on flow behaviour), isothermal flow in tubes (flow regimes, velocity profiles and volumetric flow rate-pressure drop relationships, calculation of friction losses for power-law fluids). CSA

682

O'Mahony (M). **Understanding discrimination tests: A user-friendly treatment of response bias, rating and ranking R-index tests and their relationship to signal detection.** *Journal of Sensory Studies* 7(1); 1992: 1-47

The two strategies for dealing with the response bias central to sensory difference testing (the forced choice methods (duo-trio/triangle tests) and the use of signal detection method (d-prime, proportion of area under Receiver Operating Characteristic, R-index) are explained and discussed. The relationship between R-index values obtained by rating and ranking is attempted. SD

683

Srivastav (PP), Das (H) and Prasad (S). **Sensory optimization of process variables for preparing roasted grain powders.** *Journal of Sensory Studies* 7(1); 1992: 49-56

The sensory optimization for the quality of grain powders (Bengalgram, maize and soybean) standardized in the first phase were initial moisture content 12 plus or minus 0.2%, grain-to-sand ratio 1:4 and in the second phase sand temp. 215°C and roasting time 1.5 - 2.0 min. Sand temp. greatly affected the overall quality of the roasted grain powders followed by roasting time. SD



684

Ishii (R), Vie (A) and O'Mahony (M). **Sensory difference testing. Ranking R-indices are greater than rating R-indices.** *Journal of Sensory Studies* 7(1); 1992: 57-61

R-index measures obtained by rating and by ranking were compared using a model system. The prediction that R-indices obtained by ranking should exceed values obtained by rating was confirmed for both ranking computations : R(Jacob Brown) and R(Matrix). AA

685

Malundo (TMM) and Resurrection (AVA). **A comparison of performance of panels selected using analysis of variance and cluster analysis.** *Journal of Sensory Studies* 7(1); 1992: 63-75

Ten panelists evaluated 2 coffee whiteners on 14 sensory attributes using 150 mm unstructured descriptive line scale. Factor analysis indicated that 5 factors were adequate to model the data. The reliability coeff. (omega) for the sensory ballot was 0.93. One-way analysis of variance and cluster analysis gave two different groups of 9 panelists. Means and standard deviations of the scores indicated greater variability among panel ratings with one way ANOVA than cluster analysis. SD

686

Roy (G). **Bitterness: Reduction and inhibition.** *Trends in Food Science and Technology* 3(4); 1992: 85-91

This review article examines the newer developments in food products with improved palatability, the prospects for bitterness reduction in foods, and the possibility of designing novel bitterness inhibitors. Topics covered include: approaches to bitterness reduction (processing, addition of artificial sweeteners, flavours, other bitter and sour or astringent compounds, use of miscellaneous potential food additives); specific problem areas and strategies for bitterness reduction in beverages, carbohydrate products and proteins and protein foods; correlations between models of sweetness and bitterness perception; and the search for a 'universal' bitterness inhibitor. 69 references. BV

687

Drewnowski (A). **Food preferences and the opioid peptide system.** *Trends in Food Science and Technology* 3(4); 1992: 97-99

Recent studies suggests that infusions of opioid antagonist naloxone reduces taste preferences for

sugar-fat mixtures and decreases the consumption of sweet- and high-fat foods, particularly among women. GS

## FOOD STORAGE

688

Ahmed (SG). **Design of a community grain storage complex-cum-processing centre for rural area.** *Bulletin of Grain Technology* 29(1); 1991: 22-30

A model storage complex with 135 t annual capacity and a conceptional design of processing centre was developed for storage requirement and post-harvest processing. Different size bins grouped together to form rings served as community storage complex for different commodities, extending also services like drying, cleaning, grading and processing of wheat flour making, rice/maize shelling, groundnut decortication, oil expulsion, spice grinding, dhal making, besan making, etc. and retailing of seeds, insecticides, fertilizers and farm implements. GS

## INFESTATION CONTROL AND PESTICIDES

689

Bedi (SS) and Singh (M). **Susceptibility of gram Dhora towards gamma radiations (Callosobruchus chinensis Linnaeus).** *Bulletin of Grain Technology* 29(1); 1991: 55-56

Adult *C. chinensis* Linnaeus (gram dhora) were exposed for 1 - 7 h at different distances using Am<sup>241</sup> γ-radiation. At 1 h exposure time the after effect was not significant at 5% level, but for longer exposures the effect was significant at the above level. GS

690

Gupta (A), Gupta (SK) and Banerjee (S). **A report on mites infesting stored grains in West Bengal.** *Bulletin of Grain Technology* 29(1); 1991: 47-49

Samples of stored wheat and rice collected from 3 granaries of Calcutta, Kalyani and Nadia district of West Bengal were tested for mites infestation. Among the 25 sp., the occurrence of 4 sp. viz *Cheyletus malayensis*, *Raphignathus* sp., *Pronematus fleschneri* and *Klemania plumosus* were found infesting stored grains for the first time in India. The sp. *Tyrophagus putrescentiae*, *C. eruditus* and *Fusciropoda marginata* were most common and found in samples from all the 3 localities. The other predominant sp. were *K. bengalensis* and *Leiodynychus krameri*. Among the grains, the stored wheat was more susceptible to mite attack than rice. BV



691

Singh (RB), Sircar (AR), Singh (RG), Mani (UV), Seth (J), Laxmi Devi. **Dietary modulators of lipid metabolism in the Indian diet-heart study (I.D.H.S.).** *International Journal for Vitamin and Nutrition Research* 62(1): 1992: 73-82

A diet with 27.5% energy from total fat including 10.1% energy from monounsaturated fatty acids, P:S ratio 1.38, 120 mg dietary cholesterol, 26.0 g dietary fibre per 1000 kcal is capable of modulating the lipid metabolism resulting in a significant reduction in serum total cholesterol, low density lipoprotein cholesterol and triglyceride with no reduction in high density lipoprotein cholesterol. GS

692

Sargeant (H). **The glycaemic index of foods - a review.** *Food Science and Technology Today* 5(4): 1991: 218-220

The blood glucose response differs from one food to the other, although the amount of carbohydrate is the same. This difference in glycaemic response is termed as 'glycaemic index of foods'. The reasons for the difference and variation in digestability such as processing methods, interaction with other food components, nature of starch and dietary fibre are reviewed. 28 references. GS

693

Bleyl (DWR). **Study on dietary fibre. Effects on colon carcinogenesis.** *Die Nahrung* 35(7): 1991: 767-781 (De)

694

Virupaksha (HS), Nirmala (V) and Joseph (PK). **Biochemical effects of diallyl disulphide in ethanol fed rats.** *Journal of Food Science and Technology (India)* 30(1): 1993: 33-35

Rats fed with ethanol and high lipid diet (HLD) exhibited higher levels of triacylglycerols, total cholesterol and total lipids in the serum and liver, as well as lower serum albumin and higher levels of  $\alpha$ - and  $\gamma$ -globulins. When different doses of diallyl disulphide (DASD) were fed along with ethanol to HLD fed rats, all the above lipid levels were reduced. The optimum dose of DASD for producing the hypolipidemic effects appears to be 0.66 mg/100 g body wt., when there was also an improvement in the serum albumin and  $\alpha$ -globulin levels. AA

695

Mouliswar (P), Kurien (S), Daniel (VA), Malleshi (NG) and Venkat Rao (S). **In vitro digestibility of protein and starch of energy food and its bulk reduction.** *Journal of Food Science and Technology (India)* 30(1): 1993: 36-39

Energy food had an apparent viscosity of 35,200 centipoise units (cpu) at 25% slurry concn. and this decreased at 260 cpu when it was blended with 10% malted wheat and cooked. Toasting of various ingredients such as wheat or maize, Bengalgram or peanut cake, did not have any marked effect on reducing apparent viscosity of energy food. *In vitro* protein and starch digestibility of energy food were 80 and 98% respectively. AA

696

Dave (RI), Joshi (NS), Patel (JR) and Thakar (PN). **Protein hydrolysates - a review.** *Indian Journal of Dairy Science* 44(9): 1991: 557-564

Covers history, flavour, manufacturing process (acid hydrolysis, enzymes, alkali) for protein hydrolysates, uses of protein hydrolysates (foodstuffs, noodles, cheeses, bacterial assay media, nutritional and therapeutic purposes, modified products of protein hydrolysate and plasteins). Review. 76 references. BV

697

Muschiolik (G). **Proteins as multifunctional additives in dietetic foods.** *Ernährungsforschung* 36(5): 1991: 147-152 (De)

698

Petzke (KJ), Kozlovskaja (SG), Grigorov (JG) and Albrecht (V). **On the problem of nutrition and longevity: Antioxidants.** *Ernährungsforschung* 36(5): 1991: 153-156 (De)

The possible significance of different antioxidants for life span and the processes of aging was discussed. This include naturally available antioxidants from normal food or artificial ones added to experimental diets. It appears to be relatively plausible to conclude on the base of the free radical theory of aging that antioxidants may moderate age dependent pathologies reducing free radical damages. Numerous experimental results demonstrated, but not free of contradictions, the advantageous role of antioxidants. It is suggested that life span limiting processes may be inhibited by any dietary means considering the antioxidative nature of substances or reducing the risk for free radical damage, e.g. increased uptake of natural antioxidants by specific modifications of diets, or by



specific supplementation with artificial antioxidants. AA

699

Petzke (KJ), Medovar (BJ), Grigorov (JG) and Albrecht (V). **On the problem of nutrition and longevity: The role of dietary protein.** *Ernährungsforschung* 36(6); 1991; 185-188 (De)

It remains problematical to evaluate the importance of a modified dietary protein intake (amount and source of dietary proteins) for life span and the processes of aging. Irrespective of contradictory experimental results it was suggested that an adequate protein intake which considers the possible requirements of the organism for dietary protein may be more favourable for longevity and age dependent diseases than an elevated protein intake. Furthermore, it seems reasonable that a diet based preferably on vegetable protein sources may be

advantageous. This may be at least partly due to differences in amino acid composition of such proteins. AA

## TOXICOLOGY

Nil

## FOOD LAWS AND REGULATIONS

700

Jukes (DJ). **Making food irradiation legal - past, present and future.** *Food Science and Technology Today* 5(4); 1991; 211-217







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Under Rule 8 of the Registration of Newspapers (Central Rules 1956)  
(See Rule 8)

- |  |  |
|--|--|
| 1. Place of Publication  | :MYSORE  |
| 2. Periodicity of its publication  | :Monthly   |
| 3. Printer's Name  | :Director, CFTRI, Mysore   |
| Nationality  | :INDIAN  |
| Address  | :DIRECTOR<br>CENTRAL FOOD TECHNOLOGICAL<br>RESEARCH INSTITUTE<br>MYSORE - 570 013. |
| 4. Publisher's Name  | :Director, CFTRI, Mysore.  |
| Nationality  | :INDIAN  |
| Address  | :DIRECTOR<br>CENTRAL FOOD TECHNOLOGICAL<br>RESEARCH INSTITUTE<br>MYSORE - 570 013. |
| 5. Editor's Name   | :K. A. RANGANATH   |
| Nationality  | :INDIAN  |
| Address  | : CENTRAL FOOD TECHNOLOGICAL<br>RESEARCH INSTITUTE<br>MYSORE - 570 013.            |
| 6. Name and address of individuals<br>who own the newspaper and<br>partners or shareholders<br>holding more than one percent<br>of the total capital | :DIRECTOR<br>CENTRAL FOOD TECHNOLOGICAL<br>RESEARCH INSTITUTE<br>MYSORE - 570 013. |

I, the Director, hereby declare that the particulars given above are true to best of my knowledge and belief.

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Regd. No. 36729/84

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Printed and published by Director, Central Food Technological Research Institute,  
Mysore -570 013, at CFTRI Printing Press. Editor: Shri K. A. Ranganath,  
CFTRI, Mysore.